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LANGNER (W.). **Reziprok unterschiedliches Verhalten von Lärchenbastarden gegen eine Nadelerkrankung.** [Reciprocal differential reaction of Larch hybrids to a needle disease.]—*Z. Forstgenet.*, 1, 3, pp. 78–81, 2 figs., 1952.

In 1951 a needle browning and necrosis of undetermined fungal origin severely attacked nursery material of European larch (*Larix europaea*) [*L. decidua*] in western Germany but not the Japanese (*L. leptolepis*). Interspecific hybrids proved to be resistant when *L. leptolepis* was used as the female parent and susceptible when it served as the male, suggesting that the differential reactions to the disease are genetically conditioned. It would further appear from preliminary observations that the inheritance of resistance in Scots pine (*Pinus sylvestris*) to needle cast (*Lophodermium pinastri*) [*R.A.M.*, 30, p. 439] is similarly controlled.

Record of the First Annual Convention of the British Wood Preserving Association, Cambridge, June 25th–27th, 1951.—iv+196 pp., 4 pl., 3 figs., [? 1952].

In this report W. P. K. FINDLAY (pp. 3–10) discusses the problem of designing laboratory tests to indicate with a minimum of delay the value of any substance as a wood preservative [*R.A.M.*, 31, p. 640]. After reviewing the desirable characteristics of an effective wood preservative and considering which of these substances can be submitted to laboratory tests, he concludes that it is possible by such tests to determine with some accuracy the inherent toxicity of a wood preservative, to obtain a useful indication as to its probable degree of permanence in the treated wood, and to ascertain whether it is likely to have any deleterious effects. It can then be decided whether the material merits field tests or service trials.

H. E. HICKSON (pp. 11–36) discusses the compiling of long-term service records as a means of assessing the value of preservation, and recommends setting up a committee for the compilation and publication of such records [ibid., 31, p. 414].

R. G. BENNETT and E. J. BINNS discuss (pp. 37–51) the preservation of wooden transmission poles and briefly review the methods used by the Post Office [ibid., 17, p. 425] since it took over the telegraph companies in 1870. Since January, 1951, the Post Office has further modified the Rueping or empty-cell process [cf. ibid., 30, p. 397; 31, p. 309, *et passim*] in an endeavour to obtain complete impregnation of all the sapwood of the Scots pine poles used. Creosote oil is injected until a gross absorption of 15 lb. and a net retention of 8 lb. oil per cu. ft. of timber is obtained. Larch poles were reintroduced between 1940 and 1950; a net retention of 4 lb. per cu. ft. was obtained by reducing the initial air pressure to 20 lb. per sq. in., raising the oil temperature to 160° F. with pressures up to 180 lb., and extending the impregnation period to two hours. No preservative has yet given the same durability to transmission poles so cheaply as coal tar creosote.

E. H. BROOKE BOULTON, dealing with the identification and treatment of defects in timber (pp. 52–71), discusses the moisture content of timber in relation to dry

rot (*Merulius lacrymans*) [see above, p. 2] and wet rot (*Coniophora* [*puteana*: ibid., 31, p. 154, *et passim*]), where to look for conditions that may give rise to them in buildings, and how to control them and prevent recurrence.

The paper by C. GREAVES (pp. 91–104) on the preservative treatment of Douglas fir (*Pseudotsuga taxifolia*) and western hemlock (*Tsuga heterophylla*) sleepers in Canada has already been noticed from another source [ibid., 31, p. 309].

W. ROTHWELL reviews (pp. 105–128) the position with regard to the preservation of railway sleepers in Great Britain. Before 1930 Baltic redwood [*Pinus sylvestris*] was used but thereafter up to 1939 Douglas fir was mostly employed. It was not possible to treat the latter adequately, and the proportion of sleepers found to be decayed on routine renewals of track increased. Since 1939 sleepers have been obtained from many sources; hemlock is softer and mechanically weaker than other species, and its high moisture content (about 71 per cent. in the green state) makes it difficult to air-season. This species has failed through heart rot [cf. ibid., 29, p. 3] even when the outside remained sound. British Railways work to a programme of periodic complete renewals after 17 to 20 years' life on first class plain track. Many of these sleepers are used again on secondary lines or sidings, so that in preservative practice the end aimed at is a minimum life of about 40 years. The pre-eminent preservative is still creosote. Pine sleepers treated by the full cell process [ibid., 27, p. 51; 30, p. 397; 31, pp. 95, 309, *et passim*] at about 1 gal. per cu. ft. never failed owing to decay, and some of them were perfectly sound and serving as fence posts after 60 years. Creosote has, however, become scarce and expensive, and water soluble salts of the fluorchrome and copper sulphate dichromate groups are now used, though it has not yet been proved that they will protect the sleeper as effectively as creosote over its whole life. When used at the concentrations specified by the manufacturers they are at least as toxic as creosote. One disadvantage of water solubles is that they greatly increase electrical conductivity, which creates difficulty with signalling and track circuits. However, this effect may disappear as the track ages and the sleepers dry out. Estimation of costs should be made not on the [initial] cost per sleeper, but on the annual cost per sleeper. The principal enemy of treated sleepers is *Lentinus lepideus* [cf. ibid., 31, pp. 154, 156]. The incising of Douglas fir has proved of great assistance in obtaining a properly treated outer layer; by relieving surface tension it tends to restrict surface shakes and to reduce the risk of fungi entering below the fully treated area. Incising is being adopted by British Railways as a standard treatment. Douglas fir and hemlock are usually treated by the full cell process, while the Lowry process [cf. ibid., 20, p. 99 *et passim*] is used for maritime pine [*Pinus pinaster*] and similar species. The retentions aimed at (3 per cent. solution) are, in gals. per cu. ft., 0·7 for unincised Douglas fir and hemlock, 1 for incised; and 0·9 for unincised maritime pine and similar timbers.

L. E. BROOKER gives notes (pp. 129–140) on timber preservation in New Zealand [ibid., 30, p. 595 and next abstract] with particular reference to pressure treatment, need for preservation, choice of process, application, and future developments. So far the State Advances Corporation has approved only one 'all purpose' treatment, i.e., pressure treatment with tanalith.

Dealing with wood preservation in Australia [cf. ibid., 28, pp. 53, 102; 29, p. 70], S. A. CLARKE states (pp. 141–144) that service tests have shown that *Eucalyptus* sapwood can be impregnated with and will retain enough preservative to give poles a long life. Creosote and creosote oil treatments are those usually applied. Sleepers are almost entirely *Eucalyptus*, and are almost all heartwood. Treatment in an ordinary plant with pressures up to 200 lb. per sq. in. gives low or extremely low absorptions, but at pressures of about 1,000 lb. per sq. in. penetration along the grain takes place for considerable distances. A pilot cylinder about 2 ft. in diameter by 10 ft. long has now been erected for pressures up to 1,000 lb. per sq. in. In the

high-pressure process the treating cycle is shorter, so if the time spent in opening and closing the cylinder is kept as short as possible, the increased cost of the cylinder can be offset. A new method of door closure gives opening and closing times of one minute each.

H. Alliot briefly reviews (pp. 145–151) the results of research in France on the chemical protection of green timbers by chlorine products. Industrial experiments on unbarked timbers up to the last war aimed at the control of *Stereum* spp., especially *S. purpureum* and *S. hirsutum* on beech [ibid., 12, p. 664; 16, p. 3, *et passim*]. These fungi cause losses by 'dote' [cf. ibid., 7, p. 353] which are very severe in July and increase as the season advances. Observations indicated that by establishing an effective chemical barrier on the cut ends of timber as soon as possible after felling, dote could probably be avoided. Oil–water emulsions gave the best results, and spraying gave a better coating than painting. Following these experiments a first commercial formula, cryptogil EA, was brought out. Meantime, experience has shown that beech felled in sap and treated immediately is more completely protected than that felled in winter and similarly treated. As it seemed advisable to produce a dual purpose formula with both fungicide and insecticide bases, cryptogil EA was replaced by cryptogil EA 6, associating with the chlorophenols a proportion of *gamma*-BHC, which has been further strengthened. If used in time this formula gives completely satisfactory results. A simple means of preventing cracking and possible subsequent infection consists in coating the cut ends of unbarked timbers with a product which conserves moisture, such as an emulsion containing appropriate fungicidal and insecticidal elements.

Effective protection of green sawn timbers is given by pentachlorophenate solutions of 1 to 5 per cent., treatment being by soaking or spraying in a closed cylinder. Cryptogil IS 2 is based on a chlorophenate, so buffered and balanced that it can circulate in the wood without becoming insoluble under the action of acids and other substances present in the wood before it has circulated through the poles, cryptogil IS 2 becomes very firmly fixed by combination with the tissues it impregnates homogeneously from end to end. Excellent protection results, with no leaching out.

N. A. Richardson records (pp. 152–160) some impressions of the wood preservation industry in the United States and Canada, based on an extended tour carried out in 1950, with notes on the more important species used and the preservative methods employed.

F. G. Broughall treats (pp. 161–168) on broad lines of the preparation and chemical properties of creosote oil as a timber preservative and reproduces (by permission) the British Standard Specification No. 144—1936 Coal Tar Creosote for the Preservation of Timber (types A, A2, and B).

H. A. Cox, reviewing recent activities (pp. 175–181), presents on behalf of the British Wood Preserving Association a brief summary of recent developments and publications (17 references) in the Empire and countries outside it.

Annual Report of the Forest Research Institute (New Zealand Forest Service) for the year ended 31st March, 1952.—*For. Res. Notes, N.Z.*, 1, 5, pp. 1–136, 1952. [Mimeographed.]

During laboratory rearing of *Sirex noctilio*, *Beauveria* sp. caused heavy mortality to the collections. The means by which an [unspecified] symbiotic fungus [cf. *R.A.M.*, 29, p. 302] was carried over from the larva to the adult was not ascertained, but probably the cast skins from the last larval and the pupal moults should not be detached from the ovipositor until the adult is ready to emerge. By careful treatment, with the correct slope and moisture conditions, the fungus was successfully carried through. Experiments had shown that the fungus and consequently the *Sirex* larvae could not develop properly with too high a moisture content.

Wood from trees which had just wilted owing to *Sirex* attack had a moisture content of about 40 per cent., and this appeared to be satisfactory.

D. R. Carr and H. A. Smith tested ten different solutions for the prevention of sap stain in experimental stacks of block-stacked, green *Pinus radiata*. Interim results indicate that sodium pentachlorophenate [cf. ibid., 30, pp. 89, 423; above, p. 2 and preceding and next abstracts] in combination with borax or with borax and lignasan [cf. ibid., 29, pp. 548, 597; 30, p. 336] is the most effective treatment, though only slightly better than sodium pentachlorophenate plus sodium trichlorophenate [cf. ibid., 26, p. 179]. The next effective treatments are the straight sodium pentachlorophenate solutions.

In a survey made by J. W. Gilmour of 54 permanent 0·25-acre sample plots in pure stands of *P. radiata* 20 to 29 years old in Kaingaroa Forest *Armillaria mellea* was not detected as a parasite [cf. ibid., 17, p. 714], though it was present as a saprophyte on 9 per cent. of the dead trees. Its occurrence as a saprophyte varied significantly with the site quality of the stand, 12 per cent. of dead trees in one site being infected, 6 per cent. in another, and none in a third.

In part II of this report the section dealing with mycological projects (pp. 99–120) gives a summary of work in progress or to be accomplished.

Improved mixtures of fungicides for use on lumber.—*Rep. U.S. Bur. Pl. Ind., 1949–1950*, p. 84, 1950. [Abs. in *For. Abstr.*, 13, 5, p. 558, 1952.]

Mixtures of ethyl mercuric phosphate and sodium pentachlorophenate with or without borax proved highly fungistatic to [unspecified] moulds and stain and decay fungi, when used to protect green lumber in transit or during air seasoning [*R.A.M.*, 29, pp. 130, 594, and preceding and next abstracts] in the United States. In such mixtures they are diluted with water to reduce skin irritation. Mixtures of the mercurial and the phenate, each at $\frac{3}{8}$ to $\frac{1}{2}$ the usual strength, and mixtures of these and borax, each at $\frac{3}{16}$ to $\frac{1}{4}$ the usual strength, were particularly effective, especially when used under severe seasoning conditions, and appeared far superior to increased concentrations of single fungicides.

Wright (E.). **Sapstain and decay control tests.**—*Timberman*, 53, 6, pp. 140–142, 1952. [Abs. in *For. Abstr.*, 13, 5, p. 558, 1952.]

Dipping tests, using borax, soda, and compounds containing ethyl mercuric phosphate [see preceding abstract], sodium pentachlorophenate, and sodium tetrachlorophenate, were made over a period of six years [? in Oklahoma] on short pieces of Douglas fir [*Pseudotsuga taxifolia*], Sitka spruce [*Picea sitchensis*], western hemlock [*Tsuga heterophylla*], noble fir [*Abies nobilis*], and ponderosa and sugar pine [*Pinus ponderosa* and *P. lambertiana*, respectively], which were bulk-piled in conditions suitable for the development of [unspecified] sapstain and decay.

All the chemicals, used singly or as two and three combined, gave reasonably satisfactory control of sapstain for up to three months. Tetrachlorophenate seemed superior to pentachlorophenate for the pines. Nearly all the chemicals used controlled decay for up to nine months, the outstanding exception being a mixture containing 0·85 lb. pentachlorophenate, 2·4 lb. borax, and 1·4 lb. soda to 50 gals. water. A mixture of ethyl mercuric phosphate, pentachlorophenate, and borax [loc. cit.] in the proportions 0·25 to 1 to 6 lb. in 50 gals. water was very effective. There was no evident significant difference in rate of sapwood decay between the different species.

Lindgren (R. M.). **Deterioration of southern Pine pulpwood during storage.**—*Prepr. For. Prod. Res. Soc.* 161, 12 pp., 3 figs., 14 graphs, 1951. [Received June, 1952.]

Rough and peeled pulpwood of loblolly (*Pinus taeda*) and slash (*P. caribaea*) pine

stacked in a wood yard in July and October, 1948, and May 1949, at Bogalusa, Louisiana, was sampled at intervals during one year of storage. *Peniophora gigantea* [*R.A.M.*, 19, p. 685] caused the most prevalent decay, while *Lenzites sepiaria* [ibid., 30, p. 594; 31, p. 526] became increasingly important after six months. Other minor decay fungi were *Polyporus* [*Polystictus*] *abietinus* [ibid., 31, p. 413] and *Schizophyllum commune* [ibid., 28, p. 607]. The percentage volume of wood decayed was a fairly accurate criterion of loss in specific gravity, 25, 50, and 75 per cent. decay indicating reductions of 4 to 6, 6 to 8, and 10 to 12 per cent., respectively, in the specific gravity of rough bolts. The moisture content of rough bolts remained favourable for decay even after one year of storage, while it dropped from about 120 to 30 to 40 per cent. for peeled bolts within four months. Sapstain, developing early, was later obliterated by decay. The highest percentages of stain for rough bolts were 28 for loblolly and 21 for slash, both cut in May, and for peeled 40, 19, and 44 for bolts cut in July, October, and May, respectively.

Autumn storage of rough wood reduces deterioration within storage periods of nine months; large bolts are preferable and they should be kept as long as possible. For peeled wood, on the other hand, splitting is recommended; bolts should be small and drying hastened by improved ventilation of the ricks.

Tewari (M. C.), Pande (J. N.), & Purushotham (A.). **Testing of wood preservatives. Part I. Copper–chrome–boric composition.**—*Indian For.*, 78, 9, pp. 442–453, 1952.

Accelerated tests were conducted at the Forest Research Institute, Dehra Dun, India, to determine how far the arsenic pentoxide content of ascu wood preservative [*R.A.M.*, 31, p. 95] could be replaced by boric acid, which can be obtained locally. Thin veneers of semul [*Bombax malabaricum*] 6 by 2 by $\frac{1}{8}$ in. were treated with 10, 8, and 6 per cent. solutions of the preservative at 50 lb. pressure for 30 minutes, a duplicate set being treated with ascu, and then laid in a 'test-yard' in the open on 13th November, 1950. After two years all the treated strips were still sound, whereas some of the untreated ones were destroyed within five to ten months.

Leaching tests, using chei [*Semicarpus pandurata*] and sal [*Shorea robusta*] sapwood blocks 5·1 by 2·6 by 1·6 cm., showed that only 35 to 38 per cent. of the boric acid is fixed in the wood when it is used alone, but the addition of sodium dichromate (0·75 to 1·5 times the amount) increases the fixation to 60 to 80 per cent. and compares favourably with the arsenic pentoxide fixation. However, as its toxicity is considerably less, the preservative cannot be recommended as a substitute for ascu, though it could be used in place of celcure [ibid., 31, p. 310]. For dwelling house timber (at 0·75 to 1 lb. per cu. ft.) or for packing cases (0·5) it might be preferred to ascu which is likely to give off poisonous arsenic fumes in fires.

Stegmann (G.). **Erfolgreicher Holzschutz durch neue Verfahren.** [Successful wood protection by new procedures.]—*Umschau*, 51, 19, pp. 580–582, 1 diag., 1 graph, 1951.

Important new contributions to the literature on methods of timber preservation are reviewed. It is estimated that during the last 30 years in Germany the coal tar oil impregnation of railway sleepers [*R.A.M.*, 31, p. 310] has reduced the number required from 900,000,000 to 180,000,000 [? per annum]. Taking the average service lives of untreated pine, beech, and oak sleepers to be 5, 2·5 and 13·5 years, respectively, and of treated 27, 40, and 27·5 respectively, the reductions in cost from impregnation are computed at 77·8, 91·5, and 43 per cent., respectively. In mines the annual saving effected through timber preservation has been calculated at DM. 2,000,000.

WALKER (J. C.). **Diseases of vegetable crops.**—ix+529 pp., 117 figs., New York, Toronto, London, McGraw-Hill Book Co., Inc., 1952. $7.50 or 64*s*.

The extension and specialization of vegetable cultivation in the United States have been accompanied by an increase of phytopathological problems. This useful treatise, based on a previous lithoprinted manual [*R.A.M.*, 18, p. 564], is designed to collate the essential information on the nature and control of most diseases affecting salad crops and vegetables in North America. Each of the 16 chapters is devoted to a vegetable or group of related vegetables. The aspects covered comprise symptomatology, etiology, life-cycles of the causal organisms (including such factors as modes of overwintering, spread, and relation of environmental factors), and methods of control. The discussion of each disease is followed by a list of original research papers.

HERVEY (G. E. R.) & GUNKEL (W. W.). **Low gallonage spraying of vegetable crops.** —*Bull. N.Y. St. agric. Exp. Sta.* 753, 40 pp., 6 figs., 7 diags., 1952.

An account is given of the application of insecticides (excluding wettable powders) with a low volume, tractor-mounted, weed control type sprayer which proved a practical means of control of insect pests of beans, cabbage, broccoli, carrots, and peas in western New York from 1949 to 1951, together with details of the construction of the sprayer and the materials used. It is a cheaper method, more economical in material, and is not restricted by the weather. It was used against *Macrosteles divisus*, the vector of carrot yellows [strain of aster yellows virus: *R.A.M.*, 30, p. 372], in 1949 and 1950.

ARMSTRONG (G. M.) & ARMSTRONG (JOANNE K.). **Physiologic races of the Fusaria causing wilts of the Cruciferae.**—*Phytopathology*, 42, 5, pp. 255–257, 1952.

This is an amplified version of an abstract already noticed describing the results of a joint investigation of the South Carolina Agricultural Experiment Station and the United States Department of Agriculture to determine the host relationships of the cabbage and radish wilt-inducing races of *Fusarium conglutinans* [*R.A.M.*, 31, p. 362].

BERKELEY (G. H.) & WEINTRAUB (M.). **Turnip mosaic.**—*Phytopathology*, 42, 5, pp. 258–260, 1 fig., 1952.

This is an expanded account of the writer's studies on turnip mosaic virus in Ontario, Canada, a note presenting the essential information on which has already appeared [*R.A.M.*, 31, p. 363].

MCKAY (R.). **Sugar Beet diseases in Ireland.**—ix+77 pp., 37 pl. (10 col.), Dublin, At the Sign of the Three Candles, 1952. 21*s*.

This clear and succinct account of sugar beet diseases in Ireland [cf. *R.A.M.*, 29, p. 240] is written under the auspices of the Irish Sugar Company, Ltd., to assist growers in identification and control and to provide a record of the diseases of this host known to exist in Ireland at the present time. The fungal diseases dealt with comprise black leg (*Phoma betae*) [ibid., 9, p. 220; 28, p. 619], which appears every year, taking more or less of an annual toll of plants in almost every beet field; downy mildew (*Peronospora schachtii*) [C.M.I. map No. 28], which assumed epidemic proportions about 1946; violet root rot (*Helicobasidium purpureum*); rust (*Uromyces betae*) [*R.A.M.*, 7, p. 132], which is common and widespread, though destructive outbreaks have not been reported; *Ramularia* leaf spot (*R. beticola*), often prevalent in wet years; *Cercospora* leaf spot (*C. beticola*) [C.M.I. map No. 96], of negligible importance; *Alternaria tenuis*, not uncommon; scab (*Actinomyces scabies* and *A. tumuli*), seldom of sufficient economic importance to

merit investigation; and girth scab (*A.* spp.), apparently rare. The only bacterial disease considered is crown gall (*Bacterium tumefaciens*) [*R.A.M.*, 7, p. 132], often serious in nurseries. The virus diseases comprise yellows (*Beta* virus 4) [ibid., 28, p. 264], which reached epidemic proportions in 1946 though it was negligible in 1950, and mosaic, which appears to be very rare, the author having identified only one case of it.

Investigations in 1947 by G. Cussen, appointed by the Irish Sugar Company to investigate beet seedling diseases under the direction of the author at Glasnevin, on material collected in all the beet-growing areas in 15 counties established the fact that while *Pythium* spp., *Aphanomyces* spp., *Corticium* spp., and other fungi could occasionally be isolated from seedlings affected by black leg, the predominant organism was *Phoma betae*. This fungus was found on 93 per cent. of all black leg plants submitted for examination by the Agricultural Advisers of the Company in 1947 from crops raised from seed treated with an organo-mercury dressing before sowing. The evidence showed that attacks by species of *Pythium* and *Aphanomyces* are most likely to occur on acid soils and those with a high moisture content. Attacks by *C. solani* may occur on acid or alkaline soils. Examination of beet fruit-clusters over a number of years showed that commercial material, foreign or home-grown, is invariably infected by *Phoma betae*; pycnidia were present in every sample from 14 stocks from seven European countries harvested in 1946, visible infection ranging from 17 to 77 per cent. Environmental factors, particularly those conducive to rapid growth of seedlings, are more important than seed treatment in the control of *P. betae*; removal of the hard tissues eliminates some of the infection sources and may so expedite germination as to outdistance infection.

Since 1947 the Irish Sugar Company has insisted that seed and root crops of beet (and mangold) must be grown in separate fields as far apart as possible. This has markedly reduced incidence of downy mildew.

A chapter is devoted to nutritional diseases and another to miscellaneous troubles, and the work concludes with some general observations, a glossary, and author and general indexes.

Wenzl (H.). **Krankheiten der Zuckerrübe und ihre Erkennung.** [Sugar Beet diseases and their recognition.]—*Pflanzenarzt*, 5, *Suppl.* 3, pp. 1–3, 3 figs., 1952.

This is a key to the diseases affecting sugar beet in Austria [see next abstract], grouped under four headings. Group (I), seedling diseases, comprises damping-off [of unspecified fungal origin: loc. cit.]; (II) leaf spots caused by *Cercospora* [*beticola*: loc. cit.] and *Phoma* [*betae*: *R.A.M.*, 12, p. 135 and preceding abstract], mildew (*Microsphaera betae*) [ibid., 14, p. 548], downy mildew (*Peronospora schachtii*) [loc. cit.], rust (*Uromyces betae*) [loc. cit.], and saprophytic browning associated with various fungi, principally *Alternaria tenuis*; (III) beet mosaic and yellows [ibid., 31, p. 415] viruses; and (IV) the nutritional disorders heart and dry rot (boron deficiency) [ibid., 31, p. 365 and next abstract], nitrogen, potash, and phosphorus deficiencies, and 'legginess', the term applied to a branching of the roots affecting certain varieties on unduly shallow or insufficiently 'mellow' soil [loc. cit.].

Wenzl (H.). **Die Bekämpfung der Rübenkrankheiten.** [The control of Beet diseases.]—*Pflanzenarzt*, 5, *Suppl.* 3, pp. 4–6, 1952.

Cultural practices designed to improve the structure of the soil are the principal means of combating damping-off of beet in Austria [see preceding abstract]. Legginess [loc. cit.] and truncation of the roots may be remedied by loosening the compressed layers of soil and sowing a cover crop, such as rape.

Heart and dry rot, caused by boron deficiency [loc. cit.], is curable by soil amendments of 10 to 15 kg. boric acid, 15 to 20 kg. borax, or 40 kg. 40 per cent. borax sludge per ha. A mixture of lime and ammonium nitrate containing 2·5 per cent. boric acid, obtainable from the Austrian Nitrogen Works at Linz, is usually applied at the onset of cultivation and as a top dressing after singling and again after the second hoeing in June.

Directions for the control of *Cercospora beticola* [*R.A.M.*, 18, p. 721; 31, p. 363] by copper sprays are recapitulated. Noteworthy advances have been made in breeding for resistance to leaf spot, the most promising of the lines used for several years in official tests being Sedlmayers selection *Beta* 242/53 (C53), Buszczynzki CLR, and Klein-Wanzleben CR.

Sylvester (E. S.). **Comparative transmission of Beet-mosaic virus by four aphid species.**—*Phytopathology*, 42, 5, pp. 252–254, 1952.

In continuation of previous studies at the University of California, Berkeley [*R.A.M.*, 28, p. 610], experiments were performed to examine the acquisition and transmission of beet mosaic virus by *Myzus persicae*, *M.* [*Aulacorthum*] *solani*, *M. circumflexus* [*A. circumflexum*], and *Aphis apii*.

A five-second infection feeding period with preliminary starvation, and a similar test feeding period, were insufficient for the acquisition or inoculation of the virus by any of the species tested, but ten seconds enabled *M. persicae* and *A. solani* to accomplish either process, while periods of 15 seconds were required by the other two. An optimum value for acquisition was obtained at the 20- to 25-second intervals. A preliminary starvation period of five minutes increased the efficiency of acquisition and transmission by *M. persicae* and *A. solani*, with an optimum at one hour, but five minutes' starvation after infection feeding reduced it. With the former species no transmission occurred after a 10-minute starve, while the latter was still active for fully 30 minutes. *A. circumflexum* and *A. apii* retained the virus for periods of 10 and 15 minutes, respectively, but the data concerning these species were too meagre to form a basis for comparison.

Jacks (H.). **Seed disinfection. II. Effect of various chemicals on the emergence of Lettuce and Pea seedlings.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 1, pp. 122–125, 1952.

In further studies on vegetable seed disinfection [*R.A.M.*, 32, p. 2] Imperial lettuce and Laxton Superb pea seeds were treated at the Plant Diseases Division, Auckland, New Zealand, with various commercial seed dressings alone and in combination with insecticides, a growth hormone (α-naphthalene acetic acid), a nematocide (arseno venadic acid), vitamin B, and a copper compound to determine the effect, if any, of these substances on the efficiency of the original seed dressings. The results of greenhouse and field experiments indicated that spergon, applied at the rate of 2 per cent. of seed weight, increased emergence of lettuce, while spergon and agrosan GN, both at 0·25, increased that of pea. Addition of DDT to spergon and BHC to agrosan did not affect emergence. Fixtan, at 0·5 per cent. for lettuce and 0·25 per cent. for pea, was less effective than spergon or agrosan GN; in combination with the growth hormone, vitamin B, and arseno venadic acid emergence was higher in some cases, compared with that given by fixtan alone, but the results on the whole were inconsistent and both the nematocide and copper depressed the emergence of lettuce in the field.

Hingorani (M. K.) & Malla (D. S.). **Bacterial soft rot of Onions in storage.**—*Indian Phytopath.*, 4, 1, pp. 58–59, 1951.

During the past two years studies have been made at the Division of Mycology

and Plant Pathology, Indian Agricultural Research Institute, New Delhi, on a bacterial rot of onion bulbs, the inner scales of which were soft and watersoaked and emitted a repugnant odour. Some appeared sound externally but had one or two infected scales inside. The bacterium was readily isolated in pure culture, producing dirty white colonies. Six isolates obtained from separate bulbs differed only in the intensity of the green fluorescent pigment which they produced on beef-extract-peptone broth. In inoculation experiments the organism produced a yellowish-green rot on onion, carrot, potato, and lettuce [*R.A.M.*, 27, p. 404]. From a detailed study of the properties of the organism it is evident that it is related pathologically, morphologically, and physiologically to *Pseudomonas marginalis* [cf. ibid., 31, pp. 164, 531].

JAMALAINEN (E. A.). **Sipulin tuotantoon vaikuttavista haitallisista tekijöistä ja Sipulin viljelyn edistämistoimenpiteistä.** [On factors hampering production and measures for promoting Onion cultivation.]—*Valt. Maatalousk. Tiedon.* 225, 45 pp., 14 figs., 1952. [English summary.]

Investigations during the last three years have shown that onion yellow dwarf virus, not hitherto reported from Finland [C.M.I. map No. 46], is responsible for damage to the crop. In a field experiment at the Agricultural Research Centre, Tikkurila, near Helsinki, in 1950, with a number of different varieties, the yield of the most severly attacked Kuusamo No. 7 was negligible. During the summer of 1949 at least two areas under onions in the north of Karelia were heavily contaminated.

Secondary infection by downy mildew (*Peronospora destructor*) [C.M.I. map No. 76] is prevalent in the central and southern regions of the country, but climatic conditions in the north are evidently unfavourable for disease outbreaks. In the above-mentioned experiment the percentage of primary infection was very high (up to 80 per cent.) in some varieties, with corresponding reductions in yield, and the most effective control measure was 25 hours' exposure of the setts to dry heat at 40° C. or 1½ hours' immersion in water at the same temperature.

Neck rot (*Botrytis* spp., particularly *B. allii*) [cf. *R.A.M.*, 30, p. 301] is common on stored onions. The results of experiments performed in the autumn of 1951 demonstrated the importance of storage in a dry state as a means of protection against decay. Thus, six weeks after harvesting, the incidence of rot in onions dried with their foliage at 30° to 35° for 21 days immediately on lifting, and then at 38° to 40° for seven days after topping, was only 0·3 per cent. compared with 3·2 for plants topped at harvest and immediately dried rapidly at 38° to 40°; 12·1 for a lot topped on lifting and stored without drying in a cellar at 22° with 40 to 50 per cent. relative humidity; 30·9 for 21 days' drying at 30° when the process was delayed by covering the onions; and 47·6 for the same period of drying at 17° and 50 to 60 per cent. relative humidity.

RILEY (E. A.). **Leaf spot of Parsnip caused by Phleospora crescentium (Barth.) n.comb.**—*Mycologia*, 44, 2, pp. 213–215, 2 figs., 1952.

In July, 1950, parsnip leaves covered with minute brown to black spots bearing crescent-shaped spores apparently in acervuli were received at the Plant Pathological Laboratory, Department of Research and Specialist Services, Southern Rhodesia. The fungus was identified by the Commonwealth Mycological Institute as *Cylindrosporium crescentium* Barth. (Fungi Columbiani, No. 3617) of which authentic material was available, but the correct genus was considered to be *Phleospora* as the spores are produced in pycnidia which open at maturity to form acervuli. The author therefore proposes that the fungus be transferred as *P. crescentium* (Barth.) n.comb., with an emended description.

Sprays, dusts cut damage to Celery.—*Seed World*, 71, 4, p. 41, 1952.

In experiments at the Oregon State College Experiment Station timely applications of ziram, tribasic copper sulphate, and orthocide 406 gave consistently good control of celery late blight [*Septoria apii-graveolentis* and *S. apii*: *R.A.M.*, 31, p. 362; 32, p. 7]. Dry, summer weather is most suitable for the application of these fungicides at seven to 10-day intervals or even 14-day intervals where crops are harvested early. The cost of treatment is relatively small.

Spurr (A. R.). **Fluorescence in ultraviolet light in the study of boron deficiency in Celery.**—*Science*, 116, 3016, pp. 421–423, 2 figs., 1952.

In studies at the Department of Vegetable Crops, University of California, Davis, on adaxial brown checking and abaxial cracked stem of celery, attributed to boron deficiency [*R.A.M.*, 32, p. 7], the two types of symptom were found to be due to a single physiological disorder. Macroscopic examinations were made under ultraviolet light on affected field plants of several Utah varieties, chiefly Utah 10B, and on corresponding ones grown in nutrient solution at deficient levels of boron (0 to 0·05 p.p.m.). The early adaxial brown-checking symptoms showed a bright, light blue fluorescence round the affected tissue extending about 3 mm. beyond the margin of the lesion. This vivid fluorescence makes it possible to detect the incipient stages of the condition. A second fluorescent phenomenon was the display of a bright yellow or golden colour on the surface of adaxial and abaxial lesions, the fluorescence occurring in small, scattered spots or flecks. Sometimes the flecks were so numerous that they imparted an over-all yellow appearance to the lesion. Of 298 affected plants from five localities, 87·9 per cent. showed this yellow fluorescence. Weak yellow fluorescence was also displayed by celery plants affected by various forms of injury and disease, but in no instance where such fluorescence occurred could the symptoms be misinterpreted as those of brown checking or cracked stem.

Kahn (R. P.). **An investigation of Asparagus rust and its causal agent, Puccinia asparagi DC., in Illinois.**—*Diss. Abstr.* (formerly *Microfilm Abstr.*), 12, 1, p. 9, 1952. [Mimeoprinted.]

During the past 15 years severe epiphytotics of asparagus rust (*Puccinia asparagi*) [C.M.I. map No. 216] have occurred in Illinois in spite of the extensive cultivation of the so-called rust-resistant Washington varieties [*R.A.M.*, 24, p. 216]. A period of dormancy was demonstrated to be essential for teleutospore germination, while uredospore viability was prolonged by storage in sealed glass vials at about 38° F. The most efficient method of inoculating asparagus plants in the greenhouse was to dust a uredospore-talc mixture on them when wet. In the field placing a flower-pot moist chamber over presoaked, infected, overwintered asparagus stubble induced infection.

The Washington varieties proved extremely susceptible under both greenhouse and field conditions in Illinois and are no longer considered as commercially resistant. No sources of potential resistance were located in a collection of the Washington variety from ten sources in the United States, or in nine other named varieties including American and European representatives, or in 12 selections from Canada [ibid., 30, p. 15] and South Carolina.

Protectant fungicides were ineffective in controlling the rust when applied as dusts or sprays from the ground or from aeroplanes [cf. ibid., 28, p. 560]. It was impossible to cover the new growth even with applications at two-day intervals. The harvesting and planting programmes and the presence of volunteer asparagus near commercial fields were correlated with rust epiphytotics. The practice of snapping as a method of harvesting may lead to primary infections in cut fields.

Atkins (J. G.) & Horn (N. L.). **A simple greenhouse method for evaluating fungicides for control of Cucumber anthracnose.**—*Plant Dis. Reptr*, 36, 7, pp. 270–272, 1 fig., 1952. [Multilithed.]

Field tests since 1944 against cucumber anthracnose (*Colletotrichum lagenarium*) in Louisiana having shown conclusively that good control was given by fermate, dithane Z-78, parzate, and orthocide 406, while other materials tested were unsatisfactory [*R.A.M.*, 26, p. 94; cf. ibid., 30, p. 505], greenhouse tests were made at Louisiana State University, Baton Rouge, for comparison. A modified form of Dimock's method [ibid., 30, p. 368] was used, potted plants about 6 in. high (four per 4- or 6-in. pot) being used. The fungicides were prepared at double strength, diluted 1:1 with an aqueous suspension of the conidia, and the mixture sprayed on to the plants with a glass atomizer attached to a compressed-air line. Control plants were either sprayed with the conidial suspension diluted 1:1 with tap water or left uninoculated. The plants were kept in a moist chamber for about 60 hours after treatment. The results agreed with those of the field tests.

The writers believe that this method can advantageously be used in evaluating new or experimental fungicides in areas where anthracnose as well as downy mildew [*Pseudoperonospora cubensis*: cf. ibid., 31, pp. 368, 542] must be controlled by spraying or dusting. Owing to the erratic behaviour of anthracnose under field conditions, at least in Louisiana, more information might be obtained by greenhouse than by field tests.

Lambert (E. B.) & Ayers (T. T.). **An improved system of Mushroom culture for better control of diseases.**—*Plant Dis. Reptr*, 36, 7, pp. 261–268, 1 fig., 6 graphs, 1952. [Multilithed.]

Since 1949 a system of composting and 'pasteurizing' mushroom beds which develops temperatures high enough to eliminate most pests has been tested at the Bureau of Plant Industry, Beltsville, Maryland [cf. *R.A.M.*, 20, pp. 511, 621]. A medium-strawy horse manure (1 ton) supplemented with 150 lb. dry poultry litter (1·5 per cent. nitrogen) and 30 lb. gypsum is assembled in elongated, wedge-shaped ricks about 8 feet high by 12 by 20 or more feet, and the turnings are made with a standard composting machine at random. The whole outdoor procedure is completed with three turnings, usually in about 15 days. During the first turning as much water is added as the manure will hold. During the second the supplements are added, with water if required. The third is made about five days before filling the beds or trays, sufficient water being added to bring the moisture content to about 70 per cent. All depths of fill from 4·6 to 9·1 lb. of dry matter per sq. ft. gave satisfactory yields. After filling the beds are allowed to heat naturally overnight, and then steam is turned into the room for six hours to raise the air temperature round the beds to about 150° F., the temperature of the compost being 5° to 15° higher. The bed temperature is then reduced to about 115°, the minimum air temperature being kept at about 105°, which is maintained for five to seven days. The bed temperature is then reduced rapidly to 75°.

During the low-temperature fermentation 'heat mould' often appeared after ammonification had ceased. This thermophilic mould, tentatively referred to *Torula*, produced chains of thick-walled, brown, spherical spores about 9 to 16 μ in diameter. Experiments indicated that the fungus flora in the beds was favoured by different temperatures as follows: 95° to 100°, *Coprinus* spp.; 105° to 120°, *Torula* spp.; 125° to 140°, *Actinomyces* spp. At temperatures of 150° or more there was no fungus growth, but *Chaetomium* spp. appeared when the beds were cooled.

Grain spawn is broadcast at the rate of one bottle per 60 sq. ft. and allowed to grow for about two weeks before casing. At spawning the pH of the compost is under 8·2 and the average moisture content is about 65 per cent. The beds are

spawned at 70° to 75° and the spawn is allowed to run at this temperature for five days and then lowered to 65°, during which time high humidity is maintained. All beds are cased with a Chester loam previously heated to 150° and adjusted to pH 7·5, and they are dusted every 10 days with a mixture of 1 per cent. each of parzate and lindane in an inert carrier, but this is not at present recommended for commercial practice. The dusting controlled *Verticillium* spot [*V. malthousei*: cf. ibid., 29, p. 292].

This method, used in four successive crops, gave yields of 5 and 6 lb. per sq. ft. in beds filled at the rates of 97 and 73 sq. ft. per ton of fresh manure, respectively. It is concluded that the high yields were due to the following factors. A poultry litter supplement seems to increase yield by about ½ lb. per sq. ft. The short outdoor composting period, high initial heat, and the comparatively low temperature of the second phase of pasteurization conserve carbonaceous material and possibly other nutrients. The high temperature of the first phase eliminates most known harmful organisms. The low temperature of the second phase is beneficial, probably through favourable nutrient changes and the conservation of moisture in the bed. *Torula* sp. appears to be associated with high yields. The comparatively high heat-generating capacity of the compost permits an aerated pasteurization of compost of high moisture content. Continuous forced ventilation gives adequate fresh air at all times. The use of parzate and lindane permits continuous and extended cropping at about 60° with a minimum of accumulated diseases and pests.

Stoller (B. B.). **Abnormal growth and fructification of the cultivated Mushroom.**—*Science*, 116, 3013, pp. 320–322, 1 fig., 1952.

When mushrooms [*Agaricus bisporus*] were grown in pots under bell jars with an opening at the top and another in the side, though no carbon dioxide could be detected in the jars the stems were distinctly elongated and the caps retarded. That carbon dioxide was actively evolving from the soil, even when no sporophores were growing, was proved by closing the outlets. The hypothesis is accordingly put forward that a volatile substance other than carbon dioxide affected growth [cf. *R.A.M.*, 23, p. 205]. This substance, it is assumed, is emitted from the mycelium in the compost and casing soil, and accumulates when ventilation is inadequate or growth is very thick. The substance may be a quinone, appears to act like an 'antibiotic' or defensive mechanism for mycelial growth, inhibits fructification unless it is modified in the casing soil, and affects normal growth when allowed to accumulate. Pathogens which do not attack the mycelium in the compost do so in the casing soil, where the antibiotic power of this substance is lowest. The oxidizing ability of the substance appears to be so great as to prevent the thickening of the hyphae from which the sporophores develop. The need to adjust the soil to a relatively high pH for optimum fructification indicates that the soil must be a medium suitable for rapid oxidation-reduction reactions. One function of the casing soil is to supply an alkaline-oxygenated medium for the destruction of this volatile substance.

Slagle (C. W.), Wolcyrz (Sylvia), & Price (W. C.). **Inhibition of plant virus infection by growth products of Neurospora.**—*Phytopathology*, 42, 5, pp. 240–244, 1952.

At the Department of Biological Sciences, University of Pittsburgh, Pennsylvania, filtrates of five strains of *Neurospora sitophila* [*R.A.M.*, 30, p. 98] and one of *N. crassa* [ibid., 29, p. 271] were tested on the leaves of appropriate plants for their capacity to inhibit infection by southern bean mosaic [ibid., 31, p. 369], tobacco mosaic (type [loc. cit.], Holmes's rib grass, and tomato rosette strains), tobacco necrosis [loc. cit.], and tobacco ring spot viruses.

The filtrates were mixed with the virus extracts and inoculated by rubbing. Their efficiency in reducing the number of infections varied according to the host, the maximum percentage reduction of 99 being obtained with tobacco mosaic virus (type) on Early Golden Cluster bean (*Phaseolus vulgaris*), while other high reductions were secured with the same virus strain on *Nicotiana glutinosa* (97), tomato rosette and rib grass strains on *N. glutinosa* (98 and 93), tobacco necrosis virus on Early Golden Cluster bean and necrotic-type tobacco, a derivative of *N. digluta* × *N. tabacum* (97 and 98), and southern bean mosaic virus on Kentucky Wonder wax and Early Golden Cluster beans (96 and 95). Other percentage reductions were low, while the tobacco ring spot virus on necrotic-type and Turkish tobacco was not inhibited at all.

The inhibitory principle in the filtrates was not inactivated by heating for one hour at 90° C. or 15 minutes' autoclaving at 123°, suggesting that it is non-proteinaceous. It was effective immediately after admixture with the virus, and was equally active whether mixed with the virus or applied to the host leaves either before or up to 30 minutes after inoculation, the opposite surface being as vulnerable as the one inoculated. Separation of tobacco mosaic virus from a non-infectious virus-inhibitor mixture was accomplished by two hours' centrifugation (13,000 r.p.m.).

There is reason to believe that the inhibitory substance in the *Neurospora* filtrates operates through a modification in susceptibility of the host cells, since there was no evidence that virus multiplication could be arrested or even retarded by the treatment once infection was established. It is postulated that the suppression of infection by substances such as trypsin, milk, and fungal growth products is due to the destruction of injured cells which might otherwise afford entry to the virus.

Brock (R. D.). **The use of trisodium phosphate as an inactivating agent for plant viruses.**—*J. Aust. Inst. agric. Sci.*, 18, 1, pp. 41–43, 1952.

Comparative studies were carried out at the Division of Plant Industry, Canberra, of the effectiveness of various materials as virus inactivators [see preceding abstract]. The substances were mixed with virus inoculum and the mixtures inoculated to plants of *Datura stramonium* and *Capsicum* sp. in tests with potato virus X, and to *Nicotiana glutinosa* in tests with tobacco mosaic virus [loc. cit.]. The results showed that trisodium phosphate [*R.A.M.*, 29, p. 125] was much more effective than formalin in inactivating both viruses. In tests of sterilizing media for pestles and mortars used to grind infected tissue, potato virus X was not transmitted in water added to the mortar after rinsing with 5, 10, or 20 per cent. trisodium phosphate solution, and transmission of tobacco mosaic virus was prevented by thorough washing with or immersion for half to one minute in 5 or 10 per cent. solution. Ten per cent. trisodium phosphate solution is recommended as a safe, effective sterilizing agent against both viruses for instruments and hands.

Hutton (E. M.) & Peak (A. R.). **Inoculation techniques for studying the genetics of virus resistance in plants.**—*J. Aust. Inst. agric. Sci.*, 17, 4, pp. 193–198, 1951.

Experience with viruses mechanically transferable from one plant to another has demonstrated that hand inoculation techniques need modification where the inheritance of virus resistance in hybrid progenies is the chief consideration. If some of the genes required for resistance are present in a susceptible phenotype, unsuitable inoculation techniques or insufficient attention to environmental or other factors may result in its classification as completely resistant. Such considerations

apply, especially where the less stable viruses such as tomato spotted wilt are involved, and where a somewhat large gene complex determines resistance or susceptibility.

The best source of inoculum is usually young tissue with recently developed symptoms, obtained by transfer of the virus at regular intervals of three to four weeks to young host plants. To ensure high infectivity the inoculum should be renewed at intervals; the interval varies with different viruses and for tomato spotted wilt is 20 minutes. Incorporation of an abrasive into the inoculum obviates dusting the plants before inoculation. Using potato virus X cultured in *Datura stramonium*, with globe amaranth [*Gomphrena globosa*] as indicator [*R.A.M.*, 31, p. 452], and tomato spotted wilt virus in tomato, tested on *Nicotiana glutinosa*, incorporation of the diatomaceous silica abrasive, hyflo super-cel, at 1 per cent. was found to be as effective as carborundum dusting. On raising the percentage abrasive to 1·5 the number of lesions on *N. glutinosa* was increased; higher concentrations reduced the number to below that for 1 per cent. Hyflo super-cel was successfully incorporated in bulk lots of phosphate buffer [ibid., 31, p. 474] without any loss of efficiency in the inoculation of tomato spotted wilt. The number of lesions on *N. glutinosa* increased progressively when the concentration of virus-infected leaf used in the inoculum ranged from 1:40 to 1:10, but was reduced by greater concentrations; 1:10 appears to be the optimal virus dosage for tomato spotted wilt provided the abrasive and other factors are standardized.

The maturity of the seedlings tested is important, young, vigorous plants generally giving the best results [cf. ibid., 31, p. 518]. The most accurate assessment of resistance or susceptibility is obtained during spring and autumn, when light intensity is lower [ibid., 31, p. 169].

Ramsfjell (T.). **Virussjukdommer på hagebruksplanter.** [Virus diseases of horticultural plants.]—*Frukt og Bær*, 5, pp. 44–53, 13 figs., 1952.

Following an introductory survey of the available information on the history, nomenclature, nature, and modes of infection of plant viruses, the author lists and briefly describes those affecting apple [*R.A.M.*, 30, p. 167], plum, cherry, currants, raspberry, strawberry, cucumber, bean (*Phaseolus vulgaris*), onion, lettuce, tomato, and a number of ornamentals in Norway, with a concluding note on control.

Ghillini (C. A.). **Elenco dei principali casi fitopatologici osservati nel 1951.** [List of the principal plant diseases observed in 1951.]—*Notiz. Malatt. Piante, 1952*, 18, pp. 31–37, 1952. [Mimeographed. English summary, p. 56.]

This list of 67 diseases identified during 1951 at the Observatory of Plant Diseases, Bologna, on material collected by the staff or sent in by growers includes *Peyronellaea veronensis* [*R.A.M.*, 31, p. 495] on apples, *Phomopsis occulta* [cf. ibid., 22, p. 281] on *Cupressus sempervirens* var. *pyramidalis*, and *Rhizoctonia violacea* [*Helicobasidium purpureum*] on lettuce [cf. ibid., 9, p. 220].

Conners (I. L.) & Savile (D. B. O.). **Thirtieth Annual Report of the Canadian Plant Disease Survey, 1950.**—xvi+135 pp., 1951 (issued 1952). [Mimeoprinted.]

In the section of this report [cf. *R.A.M.*, 30, p. 307; 31, pp. 49, 103] dealing with new or noteworthy diseases (pp. ii–iv) [given also in French] it is stated that race 15B of wheat stem rust (*Puccinia graminis tritici*) [cf. ibid., 31, p. 482] was widespread in Canada during 1950. Races 34, 45, and 57 of oat crown rust (*P. coronata avenae*) [cf. ibid., 23, p. 330; 29, pp. 353, 612; 30, p. 103; 31, p. 549] have increased rapidly, and in 1950 were predominant. Lucerne in Quebec was attacked for the

first time by *Corynebacterium insidiosum* [C.M.I. map No. 67 and below, p. 66]. In Ontario *P. sorghi* [*R.A.M.*, 24, p. 363; 31, p. 325] caused heavy infection of fodder maize and sweet corn. Rust (*Melampsora lini*) was the most important disease of flax in Manitoba; races capable of infecting Dakota [ibid., 30, p. 307] increased rapidly in 1949 and attacked this variety severely a year later, though Rocket and Cheyenne [ibid., 29, p. 213] remained unaffected. Soy-beans in south-western Ontario are attacked by pod and stem blight (*Diaporthe phaseolorum* var. *sojae*) [cf. ibid., 29, p. 82] and stem canker (*D.p.* var. *batatatis*) [cf. ibid., 30, p. 503; 31, p. 268]. In one year's tests in Newfoundland Katahdin was highly resistant to potato wart (*Synchytrium endobioticum*) [ibid., 31, p. 53]. Studies at Fredericton demonstrated that the virus causing bunch-top, haywire, or purple-top wilt of potatoes [ibid., 29, p. 328, and below, p. 67] may be either an aberrant strain of *Callistephus* virus 1 [aster yellows virus] or *Solanum* virus 17 [potato apical leaf roll virus: cf. ibid., 26, p. 208]. Late blight of celery (*Septoria apii-graveolentis*) [ibid., 20, p. 192] was exceptionally severe in Ontario and Quebec, except where the plants were well protected by a fungicide [cf. above, p. 58]. Heavy infections of peas by downy mildew (*Peronospora pisi*) were reported for the first time in Ontario.

Apples in Nova Scotia were more severely affected by rust (*Gymnosporangium clavipes*) [cf. ibid., 17, p. 400] than at any other time in 26 years. Canker (*Tympanis conspersa*) [cf. ibid., 7, p. 699] caused damage in a neglected orchard in Nova Scotia. Scab (*Venturia inaequalis*) [ibid., 31, p. 53] was heavy in part of the Kootenays, British Columbia. Pear fireblight (*Erwinia amylovora*) [ibid., 30, p. 307] was again serious in Creston Valley, British Columbia.

Grey mould (*Botrytis cinerea*) was serious on *Antirrhinum* and *Chrysanthemum*. *Gladiolus* yellows (*Fusarium orthoceras* var. *gladioli*) [cf. ibid., 23, p. 345] was serious in Prince Edward Island, and corm rot (*Sclerotinia draytoni*) [ibid., 31, p. 553] was prevalent in Ontario, Nova Scotia, and Prince Edward Island. Irises in parts of Ontario and Quebec were severely infected by leaf spot (*Didymellina macrospora*) [ibid., 8, p. 312; 26, p. 108; 29, p. 215]. Virus 'decline' [cf. ibid., 19, p. 412; 27, p. 134] continues to be the most serious disease of *Narcissus* in British Columbia. It was present in every planting of King Alfred on Vancouver Island; only 28·5 per cent. of the plantings had less than the 2·5 per cent. maximum allowed for certification.

Dyer (R. A.). **Plant diseases.**—*Fmg in S. Afr.*, 27, 312, pp. 179–180, 1952.

The author traces briefly the progress of plant pathology studies in South Africa from the aspects of mycology, virology, and bacteriology, with reference to the establishment of plant pathology departments, herbaria, and research stations.

Annual Report East African Agriculture and Forestry Research Organisation, 1951. —88 pp., 1 pl., [? 1952].

In the plant pathology section (pp. 25–36) of this report [cf. *R.A.M.*, 31, p. 7] H. H. Storey and L. R. Doughty, dealing with virus diseases of cassava [loc. cit.], state that some 2,900 seedlings were raised from back-crosses to cassava of hybrids of Ceara, *Manihot dichotoma*, and 'tree' cassava origin [ibid., 26, p. 282] in an attempt to improve yield while retaining resistance to mosaic. Of 300 clones tested in field trials fewer of the third back-cross generation appeared to be free from mosaic than of the second, though a high proportion in both generations were mosaic-free during most of the season. As regards yield, the third back-cross generation of Ceara origin was more promising than that incorporating *M. dichotoma*, though some clones of the latter gave reasonable yields after 11 to 12 months in the field. Few *M. melanobasis* × cassava hybrids were resistant to mosaic, but root yields were high, compared with those of other clones, and symptoms of brown streak [ibid., 31, p. 7] uncommon. There was no appreciable difference between

the yield from mosaic-free cuttings of the standard variety Msitu and the apparently mosaic-tolerant Ceara-cassava hybrid no. 4332/2 [loc. cit.]; with diseased cuttings, however, the yield of 4332/2 was about double that of Msitu, and at later harvests little different from that of healthy plants.

H. H. Storey and Mrs. A. K. Ryland report on a study of the strains of groundnut rosette virus [ibid., 31, pp. 169, 315, 320] occurring in the field. Two apparently distinct viruses, both producing a mild mottle in groundnuts, are not transmitted by *Aphis craccivora* and neither appears to be closely related to the rosette virus. Within the group of diseases known as rosette, however, variations in symptom expression commonly occur, such as 'typical' rosette, with more or less uniform leaf chlorosis and very severe stunting, and 'mosaic rosette', in which chlorosis is confined to sharply defined areas of the leaflets and stunting is less severe. Strains or mixtures of strains were extracted which produced uniformly distinct symptoms in experimental plants; all were transmissible by *A. craccivora* and are therefore probably closely related. There was evidence that some wild species of *Arachis* from overseas might be immune from rosette virus. Wingless aphids are now known to play an important part in spread of the virus, which was reduced by a water barrier.

D. L. Jennings states that in breeding maize resistant to streak virus [ibid., 30, p. 141; 31, p. 486] many inbred lines of the original resistant Peruvian maize were re-established, together with some of the durum hybrids derived from it. Many plants appeared to be immune and in others resistance took the form of an enhanced power of recovery. Selections were made of apparently resistant native varieties found in Tanganyika.

F[rances] M. L. Sheffield, in a tour of Uganda, Ruanda-Urundi, and much of the mountainous eastern region of the Belgian Congo, observed that sweet potatoes attacked by the mosaic diseases suspected to be of virus origin [ibid., 28, p. 444] displayed a wide range of symptoms, including stunting and reduction in leaf size, leaf distortion or reduction to a strap shape, marginal rolling, toughening, vein-clearing in the younger leaves, mottling, and a bronze mottling of the lower ones. In any one variety in any one locality the symptoms were generally uniform except for differences in severity. At altitudes between 4,000 and 5,500 ft. spread was very great; above 6,000 ft. it was slight; and between 2,000 (the lowest visited) and 3,500 ft. no spread occurred, even when the disease was introduced. The distribution of one aphid [unspecified] found agreed very well with that of the disease. Material propagated for distribution should be grown at low or high altitudes and vigorously rogued. The condition appears to be less serious in Kenya and Tanganyika than elsewhere in east Africa.

Further work by D. Rudd Jones on cypress canker (*Monochaetia unicornis*) [ibid., 30, p. 309; 31, p. 8] confirmed the presence of strain B [loc. cit.] on *Cupressus macrocarpa* at Kabale, near the Belgian Congo border. In unpruned, strip-by-strip, three-year-old plantations of *C. macrocarpa* and *C. lusitanica* 90 per cent. of the affected trees had crotch infections, 8·5 per cent. had cankers on other parts of the branch, some in addition to crotch cankers, 6 per cent. had stem cankers, and 2·5 per cent. had collar infections. The corresponding figures for once-pruned, pure, five- to six-year-old plantations were 44, 22·5, 66 and [?0]. The percentage recovery (i.e., occluding of cankers) was 6 for *C. macrocarpa* and 10·5 for *C. lusitanica* in the three-year-old plantations and 32·5 and 86·5, respectively, in the five- to six-year-old. Susceptibility is greatest two to three years after planting; after five years new infections occur only in actively growing leaders or branches, or through pruning scars or stem wounds. Cankers in older parts normally recover well. In a plantation at Bahati Forest, strains A and B [loc. cit.] were isolated but never from the same tree. Strain A was also present in other plantations at Bahati, where only B had been isolated in 1949. Of two collections from *Juniperus procera* one corresponds to

strain A and the other, producing mild lesions and non-pathogenic to all *Cupressus* spp. tested, is named strain D, C being a sterile, non-pathogenic culture variant. At the period of maximum production in misty weather conidia of *M. unicornis* fall rapidly in sticky masses after liberation, though a few were caught 100 m. from an infected plantation. Perithecia developed sparsely among first-formed acervuli on natural and artificial cankers over six months old, and on three cankers they were also found over a large area among the second crop of acervuli. Perithecia were produced in one culture on a sterilized twig. During the year only three new infections were found in sample plots of 500 *C. lusitanica* trees growing alone, whereas in a mixed plantation the percentage of infection rose to 94·5 in *C. macrocarpa* and 53·5 in *C. lusitanica*. When inoculated immediately after wounding the most rapid elongation of cankers was in *C. benthami*, followed by *C. macrocarpa*, *C. arizonica*, *C. lusitanica*, and *C. torulosa*, in that order. When inoculation was delayed for four days after wounding the order was *C. benthami*, *C. macrocarpa*, *C. lusitanica*, *C. arizonica*, and *C. torulosa*, which is also the order of height growth. On further delay the number of successful infections fell, *C. macrocarpa* being attacked most frequently, though in very wet conditions the numbers for *C. benthami* and *C. lusitanica* also remained high. Suberization and initiation of wound periderm occurred at about the same time in all five species, being slowest in *C. torulosa*. Both suberized cells and wound periderm can be penetrated by hyphae and with the host growth flush the mycelium ramifies more quickly in the newly formed wood than in the tissues of the cortex. *Thuja orientalis*, *Cupressocyparis leylandii* (*Cupressus macrocarpa*×*C. nootkatensis*), and *J. procera* were successfully inoculated with strains A and B; *Widdringtonia whytei* and *Podocarpus gracilior* were resistant to all strains. Conidia of strain A retained their viability under laboratory conditions for 10 to 20 months and those of B for 6 to 14 months. Only limited production of acervuli on sterilized twigs occurred at relative humidities below 96·1 per cent. Acervuli of strain A were ripe after 12 days in a saturated atmosphere at approximately 20° C., those of B after five to eight days, and those of D after 24.

In connexion with sudden death of cloves in Zanzibar [ibid., 31, p. 633] F. J. Nutman *et al.* state (pp. 42–44) that a new species of *Valsa* has been found in thousands of diseased trees. In the early stages of infection the fungus can be traced with difficulty in the more distal parts of the roots; later, it is present in the larger roots, and after the death of the tree it ramifies throughout the trunk and branches, producing a characteristic yellow stain. About three months later, fructifications appear. Proof of pathogenicity was obtained on mature trees, but all attempts to infect young trees failed. Clove die-back [ibid., 28, p. 420] was demonstrated to be due to a wound parasite, a new species of *Cryptosporella* [since described as *C. eugeniae*] which was also responsible for all observed deaths of young clove trees with symptoms like those of sudden death.

Leach (E. W.). **Administration Report of the Director of Agriculture, Trinidad and Tobago, 1950.**—ix+38 pp., 1952.

In this report [cf. *R.A.M.*, 29, p. 291] it is stated that the decrease in the Trinidad lime crop due to withertip [*Gloeosporium limetticola*: C.M.I. map No. 119] and, in particular, to epidemic die-back of the seedlings continues steadily. Budded limes on suitable stocks appear immune or highly resistant to die-back and are being planted on a large scale. When grown in unsuitable areas and under neglected orchard conditions, however, they can be just as susceptible as the seedlings. Tobago seedlings remain free from the disease. A possible fungus pathogen has been isolated from the affected trees. The disease, which is believed to be a root-disease specific to the West Indian lime, was more severe on acid soils than on those comparatively rich in calcium.

Though grapefruit collapse on sour orange stocks has not been shown experimentally to be transmissible by bud or graft, several instances have been seen in the field where the disease subsequently attacked trees immediately adjacent to one originally affected. Reduction of functioning phloem in the stock below the union accompanied by hyperplasia of the medullary rays were characteristic of the disease. Hyperplastic rays were also observed on some budded orange trees displaying similar symptoms. Dr. Schneider, of the University of California Citrus Experiment Station, confirmed that the histological pattern was not that of quick decline or tristeza [*R.A.M.*, 32, p. 18].

Sixty-first Annual Report for the year ending June 30, 1950.—88 pp., 20 pl., Tucson, University of Arizona Agricultural Experiment Station, 1951.

On p. 17 of this report [cf. *R.A.M.*, 20, p. 393] it is stated that of 25 tamarisk [*Tamarix* sp.] fence posts treated with preservatives and set in 1934 [cf. ibid., 21, p. 475] three have failed. At Kinne Ranch, near Coolidge, 19 out of 140 posts have failed, eight having been creosoted when green, immediately after cutting, and 11 after thorough seasoning. Of the 22 failures in seven years among 51 posts at Campbell Avenue farm 13 were treated with wood-tar creosote, eight with pentachlorophenol, and one with coal-tar creosote.

In a test of several cantaloupe varieties resistant to powdery mildew [*Erysiphe cichoracearum*: cf. ibid., 29, p. 604] (pp. 46–47) there was no significant difference in yield between various strains of the resistant variety No. 45. Arizona 45 was selected from the original resistant USDA 45 [ibid., 18, p. 151; 22, p. 193].

In the Plant Pathology section (pp. 66–79) it is reported that the lucerne variety Rhizoma, developed in British Columbia, has been added to the programme concerned with varietal resistance to *Corynebacterium insidiosum* [cf. ibid., 30, pp. 217, 508; 31, p. 30 and above, p. 63].

In small plots of soil infested with the lettuce drop fungus (*Sclerotinia sclerotiorum*) [cf. ibid., 30, p. 207] and irrigated at intervals of seven to ten days, pre-planting surface applications of 'aero' calcium cyanamide (20·6 per cent. nitrogen) at the rate of 1,000 lb. per acre controlled the disease in Imperial 615 and Great Lakes lettuces. Cumulative applications appeared to be non-injurious to the plants. Pre-planting applications to autumn-cutting lettuces also gave effective control, the chemical being applied before irrigation. In a Salt River Valley commercial planting in 1950 the average percentages of infected Imperial 44 lettuces in treated (as above) and non-treated areas were 0·2 and 0·6 respectively.

In 1949 losses of from 80 to 95 per cent. were caused by [beet] curly top virus in some tomato fields [cf. ibid., 29, p. 408]. In 1950 tomato plantations surrounded by barrier crops, such as lucerne and maize, did not escape infection. Most of the plants showed no external symptoms, but phloem necrosis was apparent in 98 per cent. of sections from such plants. Watermelon, honeydew melon, and cantaloupe [cf. ibid., 28, p. 267; 31, p. 472] were also infected. Beet curly top virus was prevalent in flax [cf. ibid., 28, p. 289] in the Yuma Valley, though not previously observed on this host in Arizona; the identity of the disease was confirmed by Dr. N. J. Giddings. An outbreak of the same virus in chilli [ibid., 29, p. 408] in 1949 caused 5 to 40 per cent. losses.

In 1949–50 further field surveys showed that mosaic diseases [including strains of cucumber mosaic virus: cf. ibid., 28, p. 206; 31, p. 472] were increasing in honeydew melons, part of the crop having to be abandoned in some areas; in the Deer Valley up to 95 per cent. of the plants were affected. In tests of commercial seed stocks none of the Imperial 45 cantaloupe and 1·4 per cent. of the honeydew seedlings grown in the greenhouse showed mosaic symptoms; in the field the incidence was 0·8 and 2·2 per cent., respectively. Inoculum of macerated

mosaic-infected fig leaves applied mechanically to squash cotyledons induced mosaic-like symptoms.

The perpetuation of Arizona purple-top wilt of potatoes for at least one season in the tuber and the transference of the virus by grafting to tobacco distinguish this form of the disease from the purple-top described elsewhere and caused by typical strains of aster yellows virus [ibid., 26, p. 411; 28, p. 480, and above, p. 63]. White Rose potatoes infected with the Arizona virus display a typical 'yellow-top' condition, the leaflets being yellow throughout. The disease is severe in potato fields previously planted with carrots. There is evidence that the condition is transmitted by leafhoppers. Insecticidal dusts applied at intervals of about two or three weeks during the early and mid-growing season gave almost complete control in 1950 in regions where there was heavy infestation in 1949.

Upland cotton strains selected in 1948 for the breeding of lines resistant to *Verticillium* wilt (*V. albo-atrum*) [ibid., 20, p. 393; 28, p. 573; 30, p. 367] were grown on in 1949, and three highly promising ones were tested for spinning quality. The early-maturing cotton varieties, Arizona 33 and Paula C (a Stoneville type from Missouri), yield better than San Tan Acala on land infested by root-rot (*Phymatotrichum* [*omnivorum*: cf. ibid., 28, p. 287]). Cotton in a field in Maricopa County showed an unusual form of boll rot started by an *Alternaria* sp. and later associated with *Xanthomonas malvacearum* [ibid., 28, p. 332]. Aeroplane spraying of an *Alternaria*-infected cotton field at Yuma gave successful results, and should be effective when combined with acid-delinting of the seed.

Seventeen flax varieties resistant to wilt [*Fusarium lini*: cf. ibid., 30, p. 54; 31, pp. 52, 552] grown under severe wilt conditions in the Yuma Valley in 1949 and 1950 gave average yields ranging from 24·4 to 43·8 bush. per acre. Three promising plant progenies from populations of De Anza (# 6) and 12 of Calar × 1040 were selected. Exceptionally warm weather in November and December induced death by wilt, an occurrence not observed in earlier years, when it first appeared in March and April. The variety B 5128 is recommended for planting in wilt-infested fields.

Heart-rotted celery plants frequently yielded pure cultures of *Erwinia carotovora* [cf. ibid., 7, p. 218; 28, p. 559].

Dusting of giant cactus [*Carnegiea gigantea*] against *Cactobrosis fernaldialis*, the insect carrier of the bacterium causing necrosis [*E. carnegieana*: ibid., 29, p. 310], was carried out with thiophos 3422. Of 48 plants dusted monthly from April to September, when the larvae emerge, only one died, though all were situated in heavily infected areas.

Oregon's agricultural progress through research.—*Sta. Bull. Ore. agric. Exp. Sta.* 508, 80 pp., 33 figs., 1951.

In the section on potato diseases (pp. 7–9) in this annual report for 1950–51 [cf. *R.A.M.*, 30, p. 25] J. A. Milbrath, R. A. Young, and C. Amen state that in trials in Multnomah County proper applications of insecticides to control insect vectors reduced the spread of the leaf roll virus [ibid., 31, p. 532] more than that of mosaic virus [ibid., 27, p. 86], the percentages of infection being 2·2 and 8·9, respectively, compared with 16·1 and 14 for the untreated controls. Potato seed-piece decay [ibid., 30, pp. 485, 579], due to tuber-borne and soil-inhabiting fungi [unspecified], causes a regular reduction in stand ranging from a trace to losses that require a complete replanting. A tuber unit planter, which passes the seed-pieces through a fungicide bath after cutting, gave excellent results in preliminary trials and marked yield increases were obtained after treatment with phygon (1 lb. per 100 gals. water) and semesan bel (1 to 7½). Phygon gave excellent results in all seed-piece treatments; it favours tuberization as well as protecting against decay fungi. Treatment with mercury compounds may be satisfactory if injury can be avoided by planting soon after treating.

Science for the Farmer.—*Rep. Pa agric. Exp. Sta., 1950–51* (*Bull.* 540), 64 pp., 21 figs., 1951.

In this report [cf. *R.A.M.*, 30, p. 216] H. L. Carnahan and R. G. Hanson state that root rots due to *Sclerotinia* [*trifoliorum*: ibid., 31, p. 18] and *Fusarium* [ibid., 30, p. 470] reduce red clover stands. In varietal trials *S. trifoliorum* caused greatest losses during the cooler seasons, but *Fusarium*, combined with root borer [*Hylastes obscurus*] attacks, was mainly responsible for the death of plants following the first hay cut.

W. S. Beach reports that when grass seed is given fungicidal treatment, sowing rates may successfully be reduced to a third of those usually recommended because of the resultant decrease in damping-off [ibid., 31, p. 331]. In field trials favourable results were obtained from the use of 0·5 per cent. arasan and 0·25 per cent. semesan with fescue [*Festuca* sp.], bent [*Agrostis* sp.], and bluegrasses [*Poa* sp.], and 0·25 per cent. CC 224 with *Festuca* and *Agrostis*.

Hay and maize cobs are the basis of synthetic compost for mushrooms developed by J. W. Sinden. It costs $6 to $8 per ton as against $10 to $15 for manure.

J. S. Boyle states that in 1950, 80,000 trees, mostly of different cherry varieties, were propagated from virus-free sources under Station supervision. Necrotic ring spot [ibid., 31, p. 336] spreads very rapidly, yields being reduced by about 40 per cent. during the year of shock symptom expression (usually the first year that symptoms become noticeable).

The potato variety 2XJ–1, bred by W. R. Mills, is immune from the field race of blight (*Phytophthora infestans*) but susceptible to race D [ibid., 31, p. 349]. It has shown a very high degree of resistance to leaf roll.

Of various tobacco strains developed by E. O. Schneider and W. S. Beach at the Research Laboratory, Lancaster, in 1950, five resistant to wildfire (*Pseudomonas tabacum*) [ibid., 30, pp. 200, 217], nine with combined resistance to wildfire and tobacco mosaic virus [ibid., 31, p. 355], and one resistant to mosaic, are being continued. Three of the wildfire-resistant strains grown for fermentation yielded 103 to 287 lb. tobacco per acre more than Swarr-Hibshman.

Seed of Penn State Ballhead cabbage resistant to yellows [*Fusarium conglutinans*: ibid., 28, p. 103; 31, p. 541] may be available in 1952, according to M. L. Odland. Theoretically half of the plants resulting from each cross will be resistant and will produce resistant seed.

Verslag over de jaren 1946, 1947, 1948. [Report for the years 1946, 1947, and 1948.] —*Versl. Dep. Landb. Suriname*, 67 pp., 6 graphs, [undated, received September, 1952].

The following items of phytopathological interest occur in this report (pp. 22–45). The heavy rainfall of 1948 resulted in the development of citrus [*Phytophthora*] root rot. Next in order of prevalence was scab (*Elsinoe fawcetti*) [C.M.I. map No. 125], while damping-off (*Rhizoctonia* [*Corticium*] *solani*) occurred sporadically. The incidence of phloem necrosis of coffee [*R.A.M.*, 11, p. 236] was variable.

In *Meded. LandbProefst. Suriname* 13, 1952, it is stated that all these diseases except scab are being investigated at the newly reopened Experiment Station of Surinam.

Clarke (Patricia H.) & Cowan (S. T.). **Biochemical methods for bacteriology.**—*J. gen. Microbiol.*, 6, 1–2, pp. 187–197, 1952.

Descriptions are given of a series of biochemical identification methods for bacteria employed at the National Collection of Type Cultures, London, using heavy suspensions of organisms in tap water and chemically-defined solutions. The tests are notable for their simplicity, rapidity, and reproducibility. They

include fermentations, reduction of nitrate and methylene blue, production of indole, hydrogen sulphide, and acetoin, and hydrolysis of gelatin, starch, and urea. The preformed enzymes of the bacterial cells are employed and the results are not complicated by side effects or the multiple reactions that occur in cultures growing in a nutrient medium containing the test substrate.

De Ropp (R. S.). **The action of some chemical growth inhibitors on healthy and tumor tissue of plants.**—*Cancer Res.*, 11, 9, pp. 63–68, 1 fig., 1951.

Of 53 substances applied to Golden Treasure chrysanthemum stem fragments three days after inoculation with crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) at the New York Botanical Garden [*R.A.M.*, 29, p. 294], 16 inhibited tumour formation at a concentration of 1 mg. per ml. They were analogues of pteroylglutamic acid, certain nitrogen mustards, 8-azaguanine, and cortisone. The most powerful action was exerted by A-denopterin, A-methopterin, and A-ninopterin, in which the 9- or N^{10}-methyl group was present in addition to the 4-amino. However, these compounds were equally or more potent in preventing the growth of excised tomato roots or sunflower embryos cultured *in vitro*, so that there was evidently no differential inhibitory action on the development of tumorous as opposed to healthy tissue.

Ruhloff (Marcia) & Burton (J. C.). **Compatibility of Rhizobia with seed protectants.**—*Soil Sci.*, 72, 4, pp. 283–290, 1 fig., 1 diag., 1951.

At the Research Department, Nitragin Company, Inc., Milwaukee, Wisconsin, the toxicity of arasan, arasan SF, phygon, spergon, and spergon DDT SL (containing 95 per cent. tetrachloro-para-benzoquinone and 1 per cent. DDT) to *Rhizobium* spp. from various leguminous hosts [cf. *R.A.M.*, 31, p. 587] was demonstrated by an agar plate technique. Arasan and arasan SF were more harmful than any of the other chemicals. Spergon produced a toxic zone with *R. trifolii* and *R.* sp. from cowpea but did not seriously affect the other species, while phygon was more or less inhibitory to all except *R. phaseoli*.

Absorbent paper disks, 1 cm. in diameter, were moistened with sterile distilled water, coated with the dusts at a dosage of about 0·2 gm. per disk, and placed on yeast-water mannitol (Fred and Waksman's No. 79) agar plates previously seeded with the bacteria. By this method it was found that the numbers of bacteria capable of survival in a mixture of inoculant (peat-base type) and seed chemicals in a ratio of 7 to 2 oz. (the proportions recommended by manufacturers for application to 100 lb. pea seed) were increased by planting in moist sand. Even so, however, the numbers of viable *Rhizobia* were considerably lower than in unadulterated inoculant and might not suffice to bring about effective results under unfavourable sowing conditions.

Bakewell (S. E.). **Cacao in Mexico.**—*Foreign Agric.*, 15, 12, pp. 268–269, 1 fig., 1951.

In view of the increasing demand for chocolate and cocoa and the serious decrease in output of these commodities as a result of various plant diseases, the possibility of Mexico becoming an important supplier of cacao beans is carefully examined. The crop in Mexico, which is regarded as the original home of cacao, has the advantage of being free from such deadly cacao diseases as witches' broom [*Marasmius perniciosus*: C.M.I. map No. 37], *Monilia* pod rot [*M. roreri*: see next abstract], and swollen shoot disease [*R.A.M.*, 31, p. 427].

McLaughlin (J. H.). **Some symptoms of Phytophthora palmivora Butl. infection on Theobroma cacao L. in Costa Rica.**—*Cacao* (*Int.-Amer. Cacao Cent.*), 2, 10, pp. 3–5, 1950. [Received July, 1952.]

In discussing the symptomatology of *Phytophthora palmivora* on cacao in Costa

Rica [*R.A.M.*, 31, p. 374 and next abstracts] the author states a preference for the generic name of the fungus instead of colour in the designation of the different pod rots of cacao, such as those due to *Colletotrichum* sp. [ibid., 31, p. 425], *Diplodia* [*Botryodiplodia theobromae*: see below, p. 71], *Monilia roreri* [see preceding abstract], and *P. palmivora*, because the colour of the rot is not consistent. At the Inter-American Cacao Centre Experimental Farm, La Lola, out of 89 mature pods and 199 cherelles infected by *P. palmivora*, 16 and 61 per cent., respectively, were attacked near the apex, 64 and 20 per cent. between the pod point and the pedicel, and 20 and 19 per cent. at the pedicel end. Chupon blight, caused by the same fungus [loc. cit.], may kill back the young, succulent growing tip of a chupon as many as six to eight times, growth being continued each time by a lateral bud. Brownish, depressed lesions, up to 5 cm. long and 2 cm. wide, have been observed frequently on chupon stems; their development is arrested a few days after initial infection, and they remain as depressed, corky areas frequently eaten out by insects, particularly ants. Premature fruit ripening [ibid., 31, p. 374] occurs when *P. palmivora* attacks the flower cushions, which turn brown.

Siller F. (L. R.) & McLaughlin (J. H.). **A method of evaluating fungicides for the control of Phytophthora palmivora Butl. on Theobroma cacao L.**—*Cacao* (*Int.-Amer. Cacao Cent.*), 2, 10, pp. 1–3, 1950. [Received July, 1952.]

At the Inter-American Cacao Experimental Farm, La Lola, Costa Rica, a method was developed for the primary evaluation of new fungicides against *Phytophthora palmivora* on cacao [*R.A.M.*, 31, p. 424, and preceding and next abstracts], the results of which have already been noticed [ibid., 31, p. 374]. Cacao seedlings grown under more or less natural conditions in nursery seedbeds are sprayed with the fungicides early in the morning, Bordeaux mixture being used as a standard. Late in the afternoon they are sprayed with a sporangial suspension of *P. palmivora*, prepared by brushing into 1 gal. water the sporangia from 20 affected pods that have previously been kept for 18 to 24 hours in a moist chamber. The protective value of a fungicide is assessed from counts of the numbers of plants with one or more lesions made 7, 14, 21, and 28 days after inoculation.

McLaughlin (J. H.). **Fungicidal control of Phytophthora palmivora Butl. on Theobroma cacao L. in Costa Rica.**—*Cacao* (*Int.-Amer. Cacao Cent.*), 2, 25–27, pp. 1–2, 1952.

In this summary of a paper read at the 12th International Congress of Pure and Applied Chemistry held in New York during September, 1951, an account is given of the cacao situation in Costa Rica and of the control measures so far undertaken against *Phytophthora palmivora* [see preceding abstracts]. Only partial resistance has been demonstrated, and that only in some selections. Control with Bordeaux mixture [loc. cit.] results in fewer infections on harvested pods, the leaves remain longer on the trees, which flush less often and appear more luxuriant, the 'bare tip' condition gradually disappears, fewer pods are destroyed before maturity, and the yield is markedly greater than in non-controlled areas. A full portable system and a combination portable-stationary, used at the Inter-American Cacao Centre, and a stationary system, used by a plantation company in Costa Rica, have all proved effective and economical in application.

Attention is drawn to the need for developing a fungicide suitable for use in the tropics. It should be as effective as Bordeaux mixture, adhere well under heavy and continuous rainfall, be easy to mix and apply, suitable for storage in a concentrated stable form, remain stable and retain its toxicity for several days after final preparation, and be non-toxic to plants and animals. It should be effective in small quantities at high concentrations and adaptable for use in light portable equipment, e.g., mist blowers and fog machines, or as an aerosol.

Disease problems of Cacao in Cuba.—*Cacao* (*Int.-Amer. Cacao Cent.*), 2, 25–27, p. 3, 1952.

A cacao canker, possibly die-back (*Diplodia* [*Botryodiplodia*] *theobromae*) [see above, p. 70] or bark rot (*Sphaeronema* sp.) [see next abstract], is reported by the American Embassy in Cuba to have reappeared with alarming severity in the Baracoa area since 1951, where it was responsible for the death of one-quarter of the 5,000 cacao plants in one plantation. The disease is particularly severe in plantations with insignificant shade. *Phytophthora palmivora* [see preceding abstracts], also reported from the same area, was controlled by copper sulphate or Bordeaux mixture sprays. *Rosellinia bunodes* [*R.A.M.*, 28, p. 328] and *R. pepo* [loc. cit.] have also been identified on Cuban cacao. This increase in cacao fungi is attributed by some growers to the reduction in banana planting through disease.

McLaughlin (J. H.). **Observations on Cacao in Ecuador.**—*Cacao Inform. Bull.*, 2, 4, pp. 1–5, 1950. [Received July, 1952.]

Most of the information on cacao diseases in Ecuador mentioned in this survey has already been noticed from other sources [*R.A.M.*, 31, p. 56]. None of the 50 clonal selections imported from Trinidad in 1948 and maintained at Hacienda Clementina was found to be highly resistant to witches' broom [*Marasmius perniciosus*: loc. cit.; ibid., 31, p. 424, and next abstract], but some of them seem to have a high yield potential; ICS 1, 45, and 95 are to be used extensively in the planting programme. *Diplodia* pod rot [*Botryodiplodia theobromae*: ibid., 31, p. 56] is observed only on over-ripe pods and would probably be checked by timely harvesting. *Sphaeronema* sp. [loc. cit.] and not *Phytophthora* [*palmivora*] is reported to be responsible for chupon blight [cf. above, p. 70].

Witches' broom investigation in Ecuador.—*Cacao* (*Int.-Amer. Cacao Cent.*), 2, 7, p. 4, 1950. [Received July, 1952.]

Plans are outlined for the development at the Tropical Station of Pichilingue, Ecuador, of cacao varieties resistant to witches' broom [*Marasmius perniciosus*: see preceding abstract], which causes heavy infection in the locality. The resistance of rooted cuttings is tested by placing them under heavily infected trees or by artificial inoculation with spore suspensions [*R.A.M.*, 31, p. 424].

Josephson (L. M.) & Reid (D. A.). **Variety tests of Wheat, Oats, Barley, and Corn in the Pennyroyal area of Kentucky, 1946–50.**—*Bull. Ky agric. Exp. Sta.* 569, 31 pp., 1951. [Received June, 1952.]

In 1948 a very severe epidemic of stem rust [*Puccinia graminis*] damaged the later maturing wheat varieties considerably in Kentucky [*R.A.M.*, 31, pp. 482, 546], where the experimental strains Ky 4097–35 and –37, tested in the nursery for the first time, were the only varieties with good field resistance. Leaf rust [*P. triticina*], present annually to a damaging degree, emphasized the importance of holding resistant varieties available [ibid., 31, p. 371]. Vigo is the only available commercial variety with resistance to *P. triticina*. Although not completely resistant, it usually rusts late and is damaged less severely than other varieties. Purcam and the two Ky 4097 selections were the most resistant in the tests. Thorne and Seneca were resistant to loose smut [*Ustilago tritici*: ibid., 27, pp. 227, 313].

On barley, mildew [*Erysiphe graminis*], [unspecified] leaf spots, and leaf rust [*P. hordei*: ibid., 27, p. 15] were extremely heavy in 1948. The new strains Ky Comp X-8 and Ky Comp X-43 tested for three years in the nursery and one year in plot tests, are resistant to mildew [ibid., 31, p. 372], to some races of loose smut [*U. nuda*: ibid., 31, p. 485], and to scald [*Rhynchosporium secalis*: ibid., 31, p. 549]. Comp X-43 outyielded all commercial varieties in the nursery from 1948 to 1950.

It is being increased by Kentucky Seed Stocks, Inc., and a limited amount of seed was distributed to certified seed growers in autumn, 1951.

In 1950 excess rainfall delayed maturity of maize and prevented drying after maturity, giving rise to ear rot [*Gibberella fujikuroi* and other fungi: ibid., 31, p. 61]. In general, the later-maturing prolific hybrids having husks tight around the ear had the least amount of ear rot. These hybrids were also the most resistant to stalk rotting [*Diplodia* spp. and *Gibberella* spp.: ibid., 31, p. 326]. No hybrids were completely resistant to Stewart's disease [*Xanthomonas stewarti*: ibid., 24, p. 216]. In 1948, when a high percentage of smut [*U. maydis*: ibid., 26, pp. 391, 393] was recorded, Ky 102 and Ky 405B had the least number of smutted plants.

Tochinai (Y.) & Ui (T.). **Studies on the helminthosporioses of cereals in Hokkaido (1). Influences of environmental conditions on the foot-rot of the seedlings.**—*Mem. Fac. Agric. Hokkaido*, 1, 2, pp. 113–126, 1 graph, 1952.

The most destructive *Helminthosporium* diseases of cereals in Hokkaido, Japan, are stripe disease of barley caused by *H. gramineum* [*R.A.M.*, 7, p. 504; 8, p. 530; 10, p. 232], foot and root rot of cereal seedlings and spot blotch of barley caused by *H. sativum* [ibid., 8, p. 438], and net blotch of barley caused by *H.* [*Pyrenophora*] *teres*.

A study of the environmental factors affecting foot rot of cereal seedlings and the cellular reaction of the host to the fungus showed that the optimum soil temperature for soil-borne infection is 26° C. for wheat and 30° or 26° for barley, the figures for seed-borne infection being 22° and 30°, respectively. The infected epidermal tissue of the coleoptile collapses rapidly at high environmental temperatures, entry of the fungus into the parenchymatous cells being facilitated and plant growth markedly retarded. Seedlings growing under shade provided by parchment paper were much more severely attacked than those exposed to normal sunlight, but when black paper was used infection was greatly reduced. When the fungus invaded the coleoptiles of plants growing in diffused sunlight the host cells displayed various reactions, including granulation of the protoplasm and thickening of the cell wall; hyphal growth in the coleoptile tissues was also more vigorous under these conditions than in plants in direct sunlight. Deep sowing and mechanical injuries to the leaves favour outbreaks of foot rot.

Manners (J. G.). **The establishment and maintenance of pure cultures of rust fungi.**—*Indian Phytopath.*, 4, 1, pp. 21–24, 1951.

Details are given of techniques employed currently for the cultivation of cereal rusts (*Puccinia* spp.) including the establishment of pure cultures of a particular physiologic race, inoculation techniques, varieties employed for the maintenance of particular rusts, light and temperature requirements [*R.A.M.*, 22, pp. 93, 129], and the testing of new collections and stock cultures on differential hosts.

Spores of *P. glumarum* remain viable for at least three months in proper storage; those of the other cereal rusts live for six months or more. For stock cultures the plants are inoculated on the second leaf when it is as long as the first, about twelve days after sowing. Rusted material from the field or the refrigerator should be placed on a damp filter paper in a Petri dish for a few hours before inoculation, to induce sporulation.

A variety susceptible to all known physiologic races must be used to establish a culture of an unknown rust collection. Norka wheat [ibid., 28, p. 388], for example, is highly susceptible to all wheat races of yellow rust, but eliminates any mildew (*Erysiphe graminis*) present since it is resistant to it. Brown rust (*P. triticina*) is screened out by inoculation to Fong Tien barley [ibid., 31, p. 176], susceptible to all wheat races of *P. glumarum* but immune from *P. triticina*. *P. triticina* is usually maintained on Wilhelmina or Little Club and *P. graminis* on Little Club [ibid., 31, p. 377].

Tests on differential hosts for physiologic race determination [ibid., 30, p. 460] can be carried out only at certain times of the year unless temperature- and light-controlled greenhouses are available [ibid., 24, p. 179].

Traaen (A. E.). **Retningslinjer ved prøvning av beisemidler.** [Guiding principles in the testing of disinfectants.]—*Nord. JordbrForskn.*, *1951*, 2–3, p. 495, 1951.

One of the principal objectives in the development of fungicides for the control of seed-borne diseases of cereals [see below, p. 89] should be the replacement of the highly efficient but poisonous mercurials [*R.A.M.*, 31, p. 428] by innocuous chemicals. The toxicity of mercury-containing preparations depends not only on the mercury content but also on the nature of the compounds involved [cf. ibid., 31, p. 565], which should therefore be taken into account in fungicidal evaluation tests.

The provision of completely uniform test conditions and over more than one season is desirable [cf. ibid., 31, pp. 71, 341, 550]. In some recent Norwegian experiments the efficacy of dusts was found to be largely dependent on the moisture content of the soil during germination, being considerably reduced by extreme humidity and slightly by drought. It is inadvisable, therefore, to judge a preparation solely by its performance in soil of a medium moisture content.

Costa (J. J.). **Un nuevo producto para evitar la carie de los cereales : el hexacloruro de bencene.** [A new material for eliminating bunt of cereals: hexachlorobenzene.]—*Rev. argent. Agron.*, 19, 1, pp. 44–51, 1 graph, 1952.

Although hexachlorobenzene at 1 in 1,000 had little effect on the germination of the spores of *Tilletia caries* and *T. foetens* [*T. foetida*: *R.A.M.*, 31, p. 597] in laboratory tests at Buenos Aires, Argentina, field experiments demonstrated the effectiveness of 6, 9, and 12 per cent. hexachlorobenzene dust, used at the rate of 200 gm. per 100 kg. wheat seed, in eliminating bunt, 100 per cent. healthy spikes being obtained, compared with 99·2 per cent. for copper carbonate. Hexachlorobenzene also has an advantage over the organic mercurials in being innocuous to the operator.

Artaza (C. A.). **La resistencia a 'Puccinia graminis tritici' en cruzamientos de 'Triticum × Agropyron'.** [Resistance to *Puccinia graminis tritici* in *Triticum* × *Agropyron* crosses.]—*Rev. argent. Agron.*, 19, 3, pp. 179–183, 1952.

At the Phytotechnical Institute, Castelar, Argentina, 1,720 seedlings from various *Triticum* × *Agropyron* crosses [*R.A.M.*, 31, p. 482] were inoculated first with races 15 and 17 of *Puccinia graminis tritici* [ibid., 31, p. 378] and then with the local race 1 of *Erysiphe graminis*. The results were assessed after 15 days, infection being rated in general according to the scale of Stakman *et al.* [ibid., 24, p. 272]. Resistance to both rust races was dominant in plants of 198-d_2 (*T. durum* × *A. trichophorum*), giving approximately 3 : 1 ratios for race 15, in 502_1–535_1 (*T. macha* × *A. trichophorum*), and in 1504–1170 (wheat × *Agropyron* sp.). Rust resistance and mildew susceptibility were usually dominant.

Scaramuzzi (G.). **La Tuburcinia tritici (Körnicke) Liro nella Provincia di Pavia.** [*Tuburcinia tritici* (Körnicke) Liro in the Province of Pavia.]—*Notiz. Malatt. Piante*, *1951*, 17, pp. 52–56, 1951. [English summary, p. 70. Mimeographed.]

In 1951 wheat near Ponte Nizza, Pavia, was attacked for the second successive year by stem and leaf smut due to *Urocystis tritici* [C.M.I. map No. 80]. The area affected lay in a hilly region 400 to 500 m. above sea level. The first symptoms appeared early in May, the incidence of infection being much higher than in the preceding year, averaging 15 to 20 per cent. and reaching 60 to 70 per cent. in some fields. Locally, most of the seed used is home-grown; seed treatment with Caffaro

powder reduced infection only slightly. Highest incidence occurred on land where wheat had been grown the year before, and the lowest where wheat followed *Medicago*. According to some growers heavy applications of stable manure reduced the severity of the disease.

The author suggests that the soil as well as the seed should be disinfected, and that wheat varieties with greater resistance than those at present grown be sought.

Fellows (H.), Sill (W. H.), & McKinney (H. H.). **Relative abundance of Wheat yellow streak-mosaic virus in leaves, crowns, and roots of the Wheat plant.**—*Plant Dis. Reptr*, 36, 8, pp. 319–320, 1952. [Multilithed.]

In work at the Division of Cereal Crops and Diseases, United States Department of Agriculture, and at Kansas State College, 396 two- and three-leaf wheat plants of the varieties Westar and Marquillo-Oro × Pawnee (sel. 462666) were inoculated by the carborundum-rubbing method with the yellow strain of wheat streak-mosaic virus [strain of wheat mosaic virus: cf. *R.A.M.*, 24, pp. 136, 544; 31, pp. 177, 323]. Leaves of infected field plants, both dormant and beginning active spring growth, were 100 per cent. infected in all trials, even when symptoms on the dormant leaves were absent or very diffuse. Crowns and roots from the same dormant plants gave no infection on test plants, but in plants starting spring growth 20 and 10 per cent. infection in crowns and roots, respectively, were detected. The crowns of infected two-month-old greenhouse plants were 100 per cent. infected and the roots 16 per cent., the figures for three-week-old greenhouse plants being 35 and 15 per cent. Inoculations from the leaves invariably approached 100 per cent. success.

In other work, at the Plant Industry Station, Beltsville, Maryland, infected leaves and roots were assayed from greenhouse-grown Michigan Amber plants in the 'late shooting' and 'late boot' stages. Leaf extracts gave 100 per cent. infection, but when the inoculum was obtained from roots and 5 ml. of water added per gm. before maceration, no infection resulted, as compared with 55 per cent. when undiluted root extract was employed. In a further experiment with 236 plants no natural root transmission was demonstrated.

The evidence indicates that exclusively root-feeding wheat pests (which are typically slow-moving) are less likely to be vectors than insects feeding above the soil line. The high concentrations of the virus in symptomless dormant leaf tissue suggest that leaf-feeding vectors might obtain ample quantities of the virus at any time after systemic invasion.

Morris (G. P.). **Descriptions and diagrams of Wheat and Barley varieties.**—*J. nat. Inst. agric. Bot.*, 6, 1, pp. 20–28, 4 figs., 1951.

Included in this supplementary list of recommended wheat and barley varieties [cf. *R.A.M.*, 30, p. 220] is Pilot wheat, which has remained free from loose smut [*Ustilago tritici*: loc. cit.] during three years' trials in Great Britain.

Sarasola (A. A.) & Garese (P.). **Resistencia a Helminthosporium sativum en plantitas de Trigo y Cebada por tratamiento de la semilla con sulfato de cobre.** [Resistance to *Helminthosporium sativum* in Wheat and Barley seedlings conferred by seed treatment with copper sulphate.]—*Phyton*, 1, 2, pp. 47–67, 1 pl., 1 diag., 1951. [English summary. Received 1952.]

A detailed, tabulated account is given of experiments at the Faculty of Agronomy, La Plata, Argentina, in the application of copper sulphate to wheat and barley seed for the control of *Helminthosporium sativum* [*R.A.M.*, 27, p. 67]. With wheat the best results were obtained by 9 to 21 hours' immersion of the seed in a 0·25 per cent. solution, while for barley 0·5 per cent. was more effective.

Tedin (O.) & Hellbo (E.). **Flygsotsfrekvensen hos Korn i kontrollodlingar och vid fältbesiktningar.** [The frequency of Barley loose smut in control plots and in field inspections.]—*Sverig. Utsädesfören. Tidskr.*, 62, 1, pp. 18–31, 1 diag., 1952. [English summary.]

For seed certification purposes in Sweden the extent of barley loose smut (*Ustilago nuda*) [*R.A.M.*, 23, p. 127] is determined by field inspections, at which the incidence is measured by the number of diseased plants per 10 sq. m., the maximum frequency tolerated being one smutted plant per 10 sq. m. To test the efficiency of the field inspection system samples from the mother seed lots and all certified lots from inspected fields are grown in control plots in which the percentages of loose smut are determined.

In the present study of data collected from 1940 to 1951 on Edda I, a fairly susceptible variety, Ymer and Freja (moderately resistant), and Brage (intermediate), the coefficients of correlation between smut frequency in the control plot of the mother lot and in the corresponding fields ranged from +0·43 in Edda I to +0·81 in Brage. The degree of seed infection was responsible for about one-third of the total variation in smut frequency between fields sown with the same mother lot of Edda I and for roughly two-thirds of the variation in the other varieties. There was no correlation in Ymer between the amount of infection in the field and that found in the control plots at harvest; in the other three varieties the coefficient ranged from +0·55 to +0·66. For Ymer field attacks involving up to one plant per 10 sq. m. are of no significance in forecasting the likelihood of an outbreak in the following year, but for the others variations even at this low level are of some importance. In Edda I, Brage, and Freja the increases of loose smut from the time of the field inspection to that of harvesting were 1, 0·5, and 0·1 per cent., respectively.

It is concluded that the probability of future attacks of loose smut may be more reliably predicted from its frequency at the field inspection than in the control plots of the mother lot.

Mehta (P. R.). **Covered smut of Barley and its control.**—*Agric. Anim. Husb., Uttar Pradesh*, 2, 4, pp. 3–7, 2 figs., 1951. [Received December, 1952.]

Investigations at Kanpur, Uttar Pradesh, India, on the control of barley covered smut [*Ustilago hordei*: *R.A.M.*, 30, p. 405] demonstrated the effectiveness of agrosan GN [ibid., 31, p. 540] shaken for twenty minutes with heavily infected seed of N.P. 21, the crop sustaining 0·6 per cent. infection as against 29·8 per cent. for untreated seed of the same variety. Ceresan [loc. cit.] was equally effective.

Nicholson (G.). **Acacia—a new Oat variety bred by Department of Agriculture.**—*Agric. Gaz. N.S.W.*, 62, 6, p. 294, 1951.

Acacia, a new, late-maturing oat variety bred at New England Experiment Farm, is adapted mainly to the northern and central tableland districts of New South Wales. The result of a cross between the Victoria-Richland, Algerian, and Fulghum, it is highly resistant to smut [*Ustilago avenae* and *U. kolleri*: *R.A.M.*, 29, p. 497] and moderately so to leaf [crown] rust [*Puccinia coronata*: ibid., 18, p. 239], but is susceptible to race 8 of stem rust [*P. graminis*].

Finkner (V. C.). **Genetic factors governing resistance and susceptibility of Oats to Puccinia coronata avenae Eriks. & E. Henn., race 57.**—*Iowa St. Coll. J. Sci.*, 26, 2, pp. 201–202, 1952.

An investigation was made at the Department of Agronomy, Iowa State College, to determine the genetic factors governing resistance and susceptibility to race 57 of oat crown rust (*Puccinia coronata* f. sp. *avenae*) [*R.A.M.*, 31, pp. 180, 235, 549] in the varieties Klein 69b, Trisperma, Victoria, Santa Fe, Ukraine, Landhafer,

Anthony-Bond × Boone, and Reselect Clinton, all of which were resistant except the last.

Genes M, U, or MU conditioned an immune type reaction and were dominant over all others. M_1 and L conditioned a zero type reaction and were dominant over all except M and U. V conditioned the Victoria type of rust reaction and was dominant to V_1 (two type) and epistatic to K (two type). I_k conditioned a susceptible reaction and was epistatic to K. All genes other than M and U showed independence. A table gives the proposed genotypes of the test varieties.

Susceptibility to *Helminthosporium victoriae* [loc. cit.; ibid., 31, p. 379] was dominant to and linked completely with the gene V. Susceptibility to a race of crown rust attacking Ukraine, which has the MU type of resistance to race 57, may be associated with one of these two factors.

Moseman (J. G.). **Colletotrichum graminicolum (Ces.) Wilson on Avena species.**—*Iowa St. Coll. J. Sci.*, 26, 2, pp. 253–254, 1952.

During 1948 and 1949 at the Agricultural Experiment Station, Iowa, 21 isolates of *Colletotrichum graminicola* [*R.A.M.*, 29, pp. 410, 609] from oat plants in Georgia, Mississippi, Kentucky, Louisiana, Arkansas, Missouri, Illinois, Minnesota, and Iowa, one from Ohio, and another from wheat in Virginia, were inoculated to oats by spraying the leaves with a spore-mycelial suspension. Infection was more severe when the inoculum was grown on potato-dextrose extract than on potato-dextrose agar. Consistently good infections were obtained only when free water was on the leaves while the plants were in the moist chamber; a saturated atmosphere was not sufficient. The optimum temperature for infection was about 25° C., 3° less than the optimum for growth of the fungus in culture. There was no sign of the fungus on plants grown from inoculated seed. Those grown in soil infested with *C. graminicola* were less vigorous, had fewer tillers, and were a paler green than those grown in uninfested soil.

Of the 114 'elemental varieties' tested, some of the Fulghum and all the Red Rustproof strains showed some resistance; certain varieties derived from Lee × Victoria were tolerant. Of 60 varieties from the Iowa oat breeding nursery and 19 from the 1948 U.S.D.A. Uniform Rust Nursery, the Bond derivatives reacted variably: Reselect Clinton, Andrew, and Taggart were highly susceptible while Sac, Bonham, and Eaton seemed somewhat more resistant. Most of the Victoria × Richland derivatives were susceptible but Victoria itself appeared quite resistant. Various *Avena* species were tested but only Saia, a variety of *A. strigosa*, was immune. It was also resistant to the crown and stem rusts [*Puccinia coronata* and *P. graminis*, respectively: ibid., 30, p. 311 and preceding abstract] which occurred in the nurseries at Ames and Kanawha in 1949.

None of the 12 cultures of *C. graminicola* isolated from oats grown in six States was able to infect the barley varieties Trebi and Moore or the wheat varieties Pawnee and Iohardi. This was also true of the culture isolated from oats at Ames in 1948. The Virginia wheat culture did not infect the oat varieties Reselect Clinton and Appler or the barley varieties Trebi and Moore. No physiologic races of the organism could be distinguished among the 12 cultures although there was some difference in pathogenicity.

Summers (T. E.). **Destruction of Maize roots by Pythium graminicola Subr. and Diabrotica undecimpunctata howardi Barber.**—*Iowa St. Coll. J. Sci.*, 26, 2, pp. 294–295, 1952.

In the Departments of Plant Pathology and Zoology, Iowa State College, maize plants exposed to *Pythium graminicola* [*R.A.M.*, 28, pp. 122, 170], to larvae of *Diabrotica undecimpunctata howardi*, and to a combination of both, were compared with plants grown in non-infested, steamed soil. Both agents appreciably

reduced root and top development, and of particular interest was the degree to which ear weight was also reduced by the presence of either or both. The fungi isolated most frequently in August and September from secondary roots and steles, root tips, and tissue from the lower three internodes of maize stalks were *P. graminicola* and *P. arrhenomanes* [ibid., 31, p. 430], *Gibberella saubinetii* [*G. zeae*: loc. cit.], *Fusarium* spp., and other *P.* spp.

There was no difference in the time at which *P. graminicola* became associated with the roots of maize plants grown in soil previously kept dry for 16 months up to the time of planting or in similar soil watered daily for 15 days with leachings from pots containing growing maize roots before planting. The fungus did not become associated to an appreciable degree with the roots of maize seedlings until after the sixteenth day following sowing.

Fraser (Lilian). **Seedling yellows—an unreported virus disease of Citrus.**—*Agric. Gaz. N.S.W.*, 63, 3, pp. 125–131, 5 figs., 1952.

In a survey initiated in 1950 to ascertain the incidence and severity of virus diseases in citrus trees in New South Wales, buds were taken and inserted into a variety of young citrus seedlings. This test disclosed the presence of a new virus inducing severe yellowing and stunting in the seedlings of Eureka lemon, Seville orange, grapefruit, and citron; less severe yellowing developed in Ellendale mandarin, Sampson tangelo, and citremon.

The virus appears to be ubiquitous in sweet orange and mandarin trees in coastal areas of New South Wales and is present in about 75 per cent. of sweet orange in inland areas. Its presence in West Indian lime intensified and altered the symptoms caused by the tristeza virus [*R.A.M.*, 32, p. 18] which is considered to be the same as that causing stem-pitting [ibid., 31, p. 382]. The growth of axillary shoots from the stock ceased after the production of three to eight leaves, with the occurrence of vein flecking and severe chlorosis, and considerable vein-corking and stem-splitting after three months.

The disease, provisionally termed seedling yellows or Eureka seedling virus, was transmitted from Washington navel orange and Emperor mandarin to Eureka seedlings by *Aphis citricidus*, the symptoms produced being far less severe than those produced by bud inoculation. Buds taken from the new growth of five aphid-infected seedlings failed to reproduce the disease in young Eureka seedlings, indicating that the virus may die out or become localized.

It is tentatively suggested that the new virus may be responsible for shell bark of lemons and Seville oranges [ibid., 29, p. 557] and for decline of Ellendale mandarins on rough lemon stock [ibid., 31, p. 382].

Ferrand (M.), Bachy (A.), & Ollagnier (M.). **Les carences en oligo-éléments dans les sols du Moyen Congo.** [Deficiencies in trace elements in the soils of the Middle Congo.]—*C.R. Acad. Sci., Paris*, 233, 20, pp. 1218–1220, 1951.

The progressive deterioration observed during the past ten years in the health of oil palms growing on deeply leached, quasi-impermeable soils in the French Middle Congo [cf. *R.A.M.*, 30, p. 318] is attributed to deficiencies of zinc, magnesium, manganese, copper, and boron. The results of three years' experiments showed that in the absence of at least one of these elements standard fertilizers remain totally inactive in the soil. Magnesium and manganese exerted a particularly favourable effect on the condition of the palms, some of which had developed grave symptoms of tracheomycosis [loc. cit.].

Rayner (R. W.). **Coffee berry disease—a survey of investigations carried out up to 1950.**—*E. Afr. agric. J.*, 17, 3, pp. 130–158, 2 pl., 1952.

The author gives a comprehensive review of the investigations carried out in

Kenya from 1922 to 1950 on coffee berry disease associated with *Glomerella cingulata* [*R.A.M.*, 31, p. 173], the main points covered being mycological research, environmental factors, manurial experiments, spraying, and selection of resistant lines. During the war most of the areas where infection was serious went out of production, and the only palliative measure, the growing of Blue Mountain coffee [cf. ibid., 16, p. 453], did not appeal to most planters. There was also doubt as to whether this variety would maintain its resistance. The most promising, though slowest, line of attack on the disease is by further selection of resistant varieties. The crops of a block of 300 Blue Mountain trees have been individually recorded for eight years at Kitale; good cropping trees of good quality are to be selected and multiplied for further testing and selection. The variety trial on Savani Estate, Nandi, is to be rehabilitated. A survey is being made of the extent of crop loss in existing West Rift coffee.

Mathew (K. T.). **Growth-factor requirements of Pellicularia koleroga Cooke in pure culture.**—*Nature, Lond.*, 170, 4334, pp. 889–890, 1952.

A pure culture (isolate 1) of *Corticium koleroga* obtained from coffee leaves [*R.A.M.*, 31, p. 15] and another from the Centraalbureau voor Schimmelcultures, Baarn, Holland, made good growth at the University Botany Laboratory, Madras, in a dextrose nitrate medium only when small quantities of malt yeast, coffee leaf, or fungal mat extracts were added. The addition of 250 μgm. per l. of thiamine hydrochloride to 20 ml. of a synthetic medium (pH 5·2) raised the mycelial dry weight after 30 days at 20° to 22° C. from a negligible amount to 129·5 mg., when glucose was the carbohydrate source, and to 89·9 mg. with sucrose. With 100 μgm. biotin per l. the weights were negligible with glucose and 59·7 mg. with sucrose.

Venkat Ram (C. S.). **Seed-borne fungi and loss of seedling vigour in Cotton.**—*J. Madras Univ.*, Sect. B, 21, 2, pp. 288–302, 1 pl., 1 graph, 1951.

Continuing his studies in the University Botany Laboratory, Madras, on seed-borne fungi of cotton [*R.A.M.*, 30, p. 518], the author used isolates from his earlier work in experiments to determine their influence on seedling vigour. Seeds of Karunganni I cotton (*Gossypium arboreum*) were soaked in culture filtrates and spore or mycelial suspensions of the isolates for 24 and 48 hours at laboratory temperature. A mycelial suspension of *Corticium solani* completely inhibited germination, whereas the filtrate allowed over 80 per cent. With *Aspergillus niger* the spore suspension gave 24 and 0 per cent. germination for 24 and 48 hours' soaking, respectively, as against 18 and 0 per cent. for the filtrate. *A. fumigatus* and *A. nidulans* in spore suspension reduced germination only slightly; the filtrates inhibited it completely. As the period of soaking was increased from 24 to 48 hours spore suspensions of *Rhizopus nodosus* strains A and B reduced germination from 62 to 12 and 60 to 4 per cent. respectively, and the filtrate of *Penicillium* sp. II from 85 to 5 per cent. After 48 hours the filtrate of *R. nodosus* strain A reduced germination to 48 per cent. whereas that of B completely inhibited it. Seeds soaked in the filtrate or spore suspension of *A. ustus* for 48 hours produced seedlings of little more than half the dry weight of the controls soaked in sterile distilled water for the same period. In general, soaking in spore suspensions reduced the dry weight of the seedlings more than soaking in filtrates, especially when the seeds were soaked for 48 hours. The isolates fell into three categories: (1) those reducing germination without impairing seedling vigour; (2) those impairing germination and seedling vigour, of which *A. niger*, *A. fumigatus*, *A. nidulans* and *R. nodosus* were most effective; and (3) those permitting normal germination but reducing seedling vigour.

The emergence of fuzzy and acid-delinted seeds of the H.I. variety (*G. herbaceum*) with initial moisture contents of 9 and 12·5 per cent., treated with agrosan G,

stored in sealed containers for nine weeks at 28° to 30° C., and germinated in garden soil under glasshouse conditions was much higher than for similar untreated lots. In parallel tests, freshly collected seeds known to contain only a small percentage of infection were sown after delinting and surface sterilization. Percentage germination and seedling vigour in sterile and non-sterile soils were in the ratio of 4:3.

Investigation of the relation between germination and infection in light and heavy seeds of indigenous varieties showed that most of the varieties widely cultivated in southern India contained floaters with very poor germination [cf. ibid., 25, p. 112], though the variety H.I. had a high percentage of floaters with good germination and low infection. The higher percentage infection in floaters depended partly on length of the storage period.

In a study of the pathogenicity of *R. nodosus* strain A in relation to soil moisture [cf. ibid., 30, p. 519] lowering the soil moisture content reduced considerably the germination of inoculated seeds, and at higher levels there was an increase in the percentage post-emergence infection of seedlings, the cotyledons being attacked.

Basu (S. N.). **Chaetomium brasiliensis Batista & Pontual; nutritional requirements for growth and fruiting.**—*J. gen. Microbiol.*, 6, 3–4, pp. 199–204, 1 pl., 1952.

Studies in the Microbiology Department, Indian Jute Mills Association Research Institute, Calcutta, on the nutritional requirements of a test organism (Ijmari 117) isolated from rotting jute fabric and found to be identical with both *Chaetomium brasiliensis* (*Bol. Sec. Agric. Pernambuco*, B, 15, p. 62, 1948) and *C. velutinum* [*R.A.M.*, 29, p. 324] indicated that it requires aneurin for growth and calcium, strontium, or barium and a low nutrient level for ascospore formation [ibid., 31, p. 75]. Decreasing the suboptimal doses of calcium progressively decreased the number of fertile perithecia and reduced average perithecial size, though the total number of perithecia was unaffected. Above the optimum level the formation of perithecia and ascospores, and eventually spore germination, were delayed. The fungus appeared to be capable of synthesizing aneurin slowly after growth was complete.

Mehta (T. R.) & Mital (S. P.). **Linseed breeding in Uttar Pradesh.**—*Agric. Anim. Husb., Uttar Pradesh*, 2, 4, pp. 8–11, 1 fig., 1 graph, 1951. [Received December, 1952.]

In 1939–40 flax type 1193, early maturing, highly resistant to rust (*Melampsora lini*) [*R.A.M.*, 30, p. 601; 31, p. 539], and adapted to alluvial soils, was crossed with types 477 and 483 to improve its yield, and in 1945–46 selections 1193–1 and –2 were crossed with types 485 and 491. The latest batch of hybrids are now in the F_6 generation. In 1949–50 the hybrid progenies were free from rust or showed only a trace, while varieties of known susceptibility were infected fairly heavily.

Presley (J. T.). **Colletotrichum tip blight of Kenaf: a brief history of the disease.**—*Plant Dis. Reptr*, 36, 8, pp. 333–334, 1 fig., 1952. [Multilithed.]

The destruction of the kenaf (*Hibiscus cannabinus*) crop in Cuba and Florida in 1951 was attributed to *Colletotrichum hibisci* [*R.A.M.*, 31, p. 489]. Greenhouse inoculations at the Plant Industry Station, Beltsville, Maryland, with affected material from Florida gave rise to symptoms typical of the early stages of the disease in the field, *C. hibisci* being re-isolated.

Cruikshank (I. A. M.). **Studies on the physiologic specialization of Melampsora lini (Ehrenb.) Lév. in New Zealand.**—*N.Z. J. Sci. Tech.*, Sect. B, 34, 2, pp. 128–133, 2 figs., 1952.

In studies at the Department of Scientific and Industrial Research, Christchurch,

using 12 differential varieties of linen and linseed flax: Buda (C.I. 270–1), Williston Golden (C.I. 25–1), Akmolinsk (C.I. 515–1), J. W. S. (C.I. 705–1), Williston Brown (C.I. 803–1), Very Pale Blue Crimped (C.I. 647–1), Ottawa 770 B (C.I. 355), Argentine Seln. (C.I. 462), Bombay (C.I. 42), Argentine Seln. (C.I. 705–1), Kenya (C.I. 709–1), and Abyssinian (C.I. 701), 12 physiologic races (N.Z. races 1 to 12) of *Melampsora lini* [*R.A.M.*, 31, p. 328], widely distributed in the flax-growing areas of New Zealand, were identified. The pycnidial and caeomosoral phases of *M. lini* were recorded on flax. Overwintering of the fungus in the uredosoral stage on volunteer plants was confirmed. New Zealand races 1, 2, 3, 7, 8, 10, and 11 accounted for 89·5 per cent. of the total isolates studied in 1951 when three new races (N.Z. 4, 6, and 9) were identified. Race 5, identified in 1950, was not recorded in the second year of these studies.

Boerger (A.). **Der Lein als Oel- und Faserpflanze des La Plata-Gebietes.** [Flax as an oil and fibre plant in the La Plata province.]—*Materiae veg.*, 1, 1, pp. 17–42, 1952. [French summary.]

In Uruguay 240,000 ha. or 1·23 per cent. of the area of the country is planted with flax, which is grown mainly in the south and the region west of the Uruguay river. The crop is cultivated chiefly for its oil and because of the unsatisfactory quality of the local fibre European fibre varieties were introduced. They proved to be highly susceptible to the races of *Melampsora lini* present [*R.A.M.*, 3, p. 88; 17, p. 530; 27, p. 133; 30, p. 320]. The author reviews the results of selection work for flax improvement in Argentina [loc. cit.] and Uruguay and states that varieties have been developed which yield both oil and fibre, such as the selection E2 E3, resistant to pasmo (*Septoria*) [*Sphaerella linorum*: loc. cit. and ibid., 20, p. 18] and other parasitic fungi.

Marini (Enrica). **Segnalazione di virosi della Dalia nelle culture di produzione in Italia.** [Report on virus diseases of Dahlia in propagating stocks in Italy.]—*Notiz. Malatt. Piante, 1951*, 17, pp. 13–16, 1951. [English summary, p. 69. Mimeographed.]

Dahlia plantings in Italy have been attacked for some years by virus diseases and the symptoms indicate that dahlia mosaic virus [cf. *R.A.M.*, 31, p. 478], tomato spotted wilt virus [loc. cit.; cf. ibid., 27, p. 588; 28, pp. 90, 512; 29, p. 198], and cucumber mosaic virus [loc. cit.; cf. ibid., 31, p. 121] are probably present. The symptoms on plants growing in the vicinity of Milan suggest a complex of viruses; in the field the symptoms are very conspicuous in summer and attenuated in autumn. Field observations suggest that varieties long cultivated in Italy are more susceptible to virus attack than those recently introduced, particularly those from Holland. Control is recommended by the usual methods.

Scaramuzzi (G.). **Una tipica 'alternariosi' delle piante di Garofano.** [A typical alternariosis of Carnation plants.]—*Notiz. Malatt. Piante, 1952*, 18, pp. 37–41, 1952. [English summary, p. 57. Mimeographed.]

Carnations at San Remo, Italy, were generally dwarfed with conspicuous shortening of the internodes and withering of the basal leaves, the stem, branches, and other leaves bearing elongated, irregular, rather extensive reddish-violet spots chiefly on the nodes or scattered on the leaf blades. Very frequently there was a yellowish-brown zone in the centre of the spots, and this grew progressively larger as the condition became worse, particularly when several spots became confluent. Both *Alternaria dianthicola* [cf. *R.A.M.*, 31, p. 239] and *A. dianthi* [ibid., 19, p. 349; 30, p. 418] were identified in infected material. Inoculations into needle-pricked and unwounded Rosso Traverso plants with a conidial suspension of

A. dianthicola gave rise to yellowish-brown spots some mm. in diameter surrounded by an intense, diffuse, reddish-violet halo, much more diffuse on the leaves than on the stems. These symptoms became progressively more marked and in three weeks the colouring of inoculated plants somewhat resembled that of affected plants in the field. When two other varieties were similarly inoculated with *A. dianthicola* infection appeared only as a rather extensive yellow-brown spotting, sometimes with a reddish-violet ring. When the inoculations were made with *A. dianthi* marked withering of the basal leaves developed, with yellow-brown spotting resembling that caused by *A. dianthicola*, but more extensive and without the violet colouring. It is concluded that the disease was due to infection by both fungi together, most of the damage probably being caused by *A. dianthi*.

Preliminary experiments on control indicated that good results may be expected to follow three to five applications at intervals of about ten days of Caffaro powder or an organic fungicide such as zerlate, karbam white, zincate, fermate, or bioquin 1.

Pelluchi (Luisa). **Segnalazione dell' Albugo candida su di una nuova pianta ospite.** [Report of *Albugo candida* on a new host plant.]—*Notiz. Malatt. Piante, 1951*, 17, pp. 39–46, 1951. [English summary, p. 69. Mimeographed.]

In August, 1951, the basal leaves of a plant of *Sisymbrium pinnatifidum* growing in a garden at Arona, on the shore of Lake Maggiore, Italy, were infected by *Albugo candida* [*Cystopus candidus*: cf. *R.A.M.*, 10, p. 556; 18, p. 228; 19, p. 381; 27, p. 542, *et passim*]. The author reviews the literature on the subject with a list of 40 references and gives all the hosts hitherto recorded.

Beaumont (A.). **Diseases of Verbenas.**—*Gdnrs' Chron.*, Ser. 3, 132, 3437, p. 204, 1952.

The only disease affecting *Verbena hybrida* reported in England is wilt caused by *Phytophthora parasitica* [*R.A.M.*, 16, p. 727]. It is preventable by soil sterilization with steam or formalin, while watering with Cheshunt compound reduces its severity.

Davis (Lily H.). **The Heterosporium disease of California Poppy.**—*Mycologia*, 44, 3, pp. 366–376, 1 pl., 2 figs., 1952.

This study of *Heterosporium eschscholtziae* on *Eschscholtzia californica* in California is an expanded account of work already noticed from another source [*R.A.M.*, 31, p. 122].

Flowering Dogwood spot anthracnose and its control.—*Plant Dis. Reptr*, 36, 7, pp. 294–299, 3 figs., 1 map, 1952. [Multilithed.]

Under the heading cited above short articles on spot anthracnose (*Elsinoe corni*) [*R.A.M.*, 30, p. 613] of flowering dogwood (*Cornus florida*) are given by various authors. Anna E. Jenkins records it from Maryland; G. F. Weber from Gainesville, Florida; J. H. Miller from Athens, Georgia, where trees affected in 1951 had the same degree of infection in 1952, and there was very little increase in numbers, and from Atlanta, where the disease was spreading very slowly among trees in streets; and J. S. Boyce from South Carolina. Anna E. Jenkins found that the best growth occurred in culture at 20° and 25° C. R. S. Cox and J. W. Heuberger present experimental evidence indicating that control may be possible by spraying.

New turf fungicide out.—*Agric. Chemic.*, 7, 2, p. 73, 1952.

A new turf fungicide, 'calocure' (Mallinckrodt Chemical Works, St. Louis, Missouri), developed in co-operation with the Rhode Island Agricultural Experi-

ment Station, is stated to give effective control of brown patch [*Corticium solani*: *R.A.M.*, 31, p. 331]. It is a formulation of mercury chlorides with additives which increase their fungal toxicity.

Weimer (J. L.). **Pythium root and stem rot of Lupines.**—*Plant Dis. Reptr*, 36, 7, pp. 279–282, 2 figs., 1952. [Multilithed.]

Numerous blue and white lupins (*Lupinus angustifolius* and *L. albus*) approaching maturity were dead and dying in fields at Experiment, Georgia, in the spring of 1948, *Pythium ultimum* being consistently detected in the roots and stems [cf. *R.A.M.*, 6, p. 510; 30, p. 418]. Later, greenhouse plants past the seedling stage succumbed to what appeared to be the same disease. The leaves of affected blue lupins did not drop for some time. Plants attacked early wilted and died without setting seed, whereas those infected later set some seeds which, if they matured, were small and shrunken. The roots were almost completely destroyed, but before decomposing were dark brown to nearly black. In potted blue lupins in the greenhouse the base of the stem turned dark brown, finally almost black. The discoloration spread upwards, sometimes for a foot or more, but usually not at a uniform rate on all sides. The tissue beneath the surface of the green part above the discoloured zone was darkened for a considerable distance. Fairly large plants were killed in two or three weeks, the fibrous roots being eventually destroyed by a moist brown rot. The woody cylinder of the upper part of the root and base of the stem was brown to almost black.

In greenhouse inoculations in 1948 and 1952 into wounded and unwounded blue lupin stems above and below soil level with two isolates, infection with characteristic symptoms was secured, except sometimes when the plants were uninjured.

Swenson (K. G.). **Aphid transmission of a strain of Alfalfa mosaic virus.**—*Phytopathology*, 42, 5, pp. 261–262, 1952.

At the Division of Entomology, University of California, Berkeley, transmission tests were conducted with 12 species of aphids to determine the most efficient vectors of lucerne mosaic virus [*R.A.M.*, 30, p. 283]. Chilli (*Capsicum frutescens*) was used as both a virus source and test plant in the tests with *Aphis gossypii*, one of the two most efficient species, the other being *Macrosiphum pisi* [*Acyrthosiphon pisum*], for which chilli also served as the source and broad bean as the test plant. A smaller number of transmissions was effected by *Aphis medicaginis*, *M. solanifolii* [*M. euphorbiae*], *Myzus persicae* (source either chilli or jimsonweed [*Datura stramonium*], test plant chilli or broad bean), and *A. fabae* (source broad bean, test plant chilli or broad bean), and none by the other species.

Lucerne mosaic virus exhibited the characteristic features of the non-persistent group of insect-transmitted viruses [ibid., 19, p. 230]. A period of one hour's starvation of *A. gossypii* immediately preceding five minutes' feeding on a diseased plant greatly increased the extent of transmission. The virus was retained for less than one hour by non-feeding aphids and was transmitted without a latent period in the vector.

Dillon Weston (W. A. R.), Storey (I. F.), & Ives (June V.). **Apple scab in the Wisbech area.**—*Gdnrs' Chron.*, Ser. 3, 132, 3436, p. 195, 1952.

A careful examination of buds of the apple variety Bramley Seedling in the Wisbech area in the second week of May, 1952, when scab (*Venturia inaequalis*) [*R.A.M.*, 32, p. 23] was already showing on some of the leaves, revealed 40 per cent. infected buds of which 8 per cent. had well-established scab pustules on scales still attached to the twigs. This indicates that the presence of infected buds on the trees at the start of the season is probably responsible for the difficulty in

obtaining a good control in this area which, owing to its low-lying orchards, is very favourable for infection.

Hårdh (H. J. E.). **Keltamuumiotaudin tarttuvaisuudesta sekä sen ehkäisemisestä paration-valmisteilla.** [The pathogenicity of brown rot and its control by a parathion preparation.]—*Maataloust. Aikakausk.*, 23, pp. 79–87, 1 fig., 1 graph, 1951. [English summary. Received June, 1952.]

When conidia of *Sclerotinia fructigena* were applied to uninjured and slightly damaged apple fruits [*R.A.M.*, 31, p. 437] at the Agricultural Research Centre, Tikkurila, Finland, no infection resulted, whereas those (*a*) bearing small lesions due to *Venturia inaequalis*, (*b*) severely corked and cracked, or (*c*) attacked by *Carpocapsa* [*Cydia*] *pomonella* [ibid., 30, p. 168] contracted 7·1, 20, and 75 per cent., respectively. When the conidia were inserted into a knife wound all the fruits developed brown rot. The susceptibility of the different kinds of lesions to infection by *S. fructigena* is attributed primarily to the moisture of the substratum and of the air in the immediate vicinity of the growing hyphae.

In laboratory experiments, using six inoculated Charlottenthal apples for each treatment, dipping (corresponding in effect to one spray application) in 0·1 per cent. mercuric chloride or in 0·1 per cent. parathion (Å/S Cheminova, Tanska) retarded the growth of the fungus [cf. ibid., 30, p. 348], while 24 and 48 hours' immersion in the same preparation allowed only slight growth. The development of the pathogen was similarly inhibited by soaking in 0·05 per cent. copper sulphate, 0·5 per cent. tannin, 1 per cent. iron sulphate, or 0·1 per cent. hydroquinone. Parathion also gave promising results in a preliminary field trial in 1950.

Thomas (W. D.) & Henderson (W. J.). **Spray experiments for the control of fire blight on Apples and Pears, 1947–1950.**—*Plant Dis. Reptr*, 36, 7, pp. 273–275, 1952. [Multilithed.]

Spraying tests carried out in several localities in Colorado from 1947 to 1950 on apple and pear trees against fireblight (*Erwinia amylovora*) [cf. *R.A.M.*, 31, p. 242 and above, p. 63] showed that an application of dithane Z-78 (2 lb. per 100 gals. water plus triton B-1956 spreader) at the 10 per cent. bloom stage and a further one at full bloom reduced incidence of current season blossom and twig infection by approximately 75 per cent. In regions where the blossoming period is much longer an additional application should be made at about the 90 per cent. petal-fall stage.

Woodhead (C. E.) & Jacks (H.). **Nature and control of ripe spot of Apples.**—*N. Z. J. Agric.*, 84, 3, pp. 239–240, 1 fig., 1952.

Trials were conducted from 1949 to 1951, inclusive, by the Plant Diseases Division of the Department of Scientific and Industrial Research for the control of apple ripe spot (*Neofabraea malicorticis*) [*R.A.M.*, 26, p. 202] in New Zealand. In treatments with new fungicides (all wettable powders) tested at two concentrations with two applications of each in mid-January and mid-February, respectively, fruit was much brighter and smoother skinned than that from Bordeaux-sprayed trees. In the first trial the lowest infection percentages on Sturmer fruit (*a*) harvested in May and (*b*) stored for one month were 16·3 and 21·1, respectively, for Bordeaux mixture (2–6–100 and 1–2–100 for the two treatments, respectively), and 19·9 and 23·4, respectively, for zerlate (at 1·5 lb. per 100 gals. water), compared with 40·3 and 46·5, respectively, for the untreated. In the second trial Bordeaux mixture gave 4·1 and (after 3 months' storage) 32·8, zerlate (3 in 100) 6·5 and 27·1, and the untreated 22·3 and 85·1 per cent. infection, respectively. In the third trial

with Golden Delicious apples harvested in May the lowest infection percentage, 3·6, was obtained with 3 in 100 zirospray (70 per cent. micronized ziram) compared with 38·7 for 1·5 per cent. zirospray, 43·8 for Bordeaux mixture, and 72·1 for trees receiving the general sulphur spray schedule. The results of these experiments indicate that materials based on ziram were equal and on one occasion superior to Bordeaux mixture in their effectiveness against ripe spot. They are recommended for trial at the rate of 2 lb. per 100 gals. water.

Leyendecker (P. L.). **Cytospora canker of Apple in New Mexico.**—*Plant Dis. Reptr*, 36, 7, pp. 276–277, 1 fig., 1952. [Multilithed.]

A survey in March, 1952, in San Juan County, New Mexico, showed that a canker-forming fungus was causing severe damage in many apple orchards, the extent of damage in any one orchard depending on the percentage of Rome Beauty present. In one four-year-old orchard the disease killed 85 per cent. of the Rome Beauty trees and injured the remainder. This variety is not exceptionally winter hardy locally, and in most cases infection appeared to follow winter injury and sun scald. Isolates from active cankers proved to be *Cytospora* [*Valsa*] *leucostoma* [*R.A.M.*, 1, p. 181; 11, p. 186; 31, pp. 21, 354]. Orchardists reported that small trunks became girdled in one or two weeks in early spring; as temperatures increased, fungal activity was retarded, the active areas appearing to become desiccated and inactive until the ensuing spring. In some orchards active cankers were removed by cutting away the infected bark, the wounds being treated with Bordeaux paste. Other growers checked enlargement by spraying the infected parts with 4–4–50 Bordeaux at high pressure.

Refatti (E.) & Ciferri (R.). **Defogliazione, flittene della scorza, rachitismo e necrosi su Meli, nella regione Trentino-Alto Adige da borocarenza.** [Defoliation, bark measles, stunting, and necrosis of Apples in the Trentino-Alto Adige area caused by boron deficiency.]—*Notiz. Malatt. Piante, 1952*, 18, pp. 1–20, 3 pl., 1952. [English summary, p. 56. Mimeographed.]

For some years past apple trees in the Trentino-Alto Adige area (northern Italy) have suffered from a wilt disease resembling that reported by Petri [*R.A.M.*, 14, p. 317] and having certain features in common with pear decline [ibid., 29, p. 103]. The symptoms, which include death or reduced vitality of the buds, defoliation, withering of the shoots and branches, rosette formation of the leaves, necrosis of the phloem, and the formation of pustules on the branches, develop in spring and affected trees die or become moribund in three or four years. In summer growth is usually renewed but the new shoots in turn become affected. Production ceases almost completely during the first year as a result of the flowers aborting or the young fruits being shed. There is also a more rapid form of the disease. In the slow form progress of the wilt is centripetal, the condition initially affecting one or two small branches at the top and spreading downwards. In moderately early stages the crowns are withered and some portions completely defoliated, the tissues of the phloem and wood being completely brown but still turgid; below the crown is a zone with rosetted leaves, and beneath this the leaves gradually become more normal. The necrosis of the phloem and cambium is less conspicuous near the rosetted zone and disappears in the normal part, where the bark pustules also gradually disappear.

Applications of borax, alone and in combination with potassium sulphate and zinc, appear to be giving good results. It is concluded that the condition is probably due to boron deficiency [cf. ibid., 30, p. 475] aggravated by potassium deficiency. Frost injury, possibly an indirect result of boron deficiency, may also play a part. Further work is in progress.

Byrde (R. J. W.). **Experiments on the control of brown rot of Apples and Plums.** —*J. hort. Sci.*, 27, 2, pp. 130–144, 1 pl., 1952.

In preliminary spore germination tests at Long Ashton with *Sclerotinia laxa* and 33 fungicides [cf. *R.A.M.*, 30, p. 331; 31, p. 290], using the test-tube dilution technique [ibid., 26, p. 497], the final concentration of spores being 50,000 per ml. and that of the orange juice admixture 0·1 per cent., the fungistatic ED50 values (p.p.m. of mercury) were 0·069 for diphenyl mercuric salt of di-2:2′ naphthyl methane-3:3′-disulphonic acid, 0·077 for phenyl mercury acetate (90 per cent.), 0·083 and 0·066 for phenyl mercury chloride, 0·053 for phenyl mercury formamide, 0·13 for phenyl mercury monoethanol ammonium acetate, (and in p.p.m.) 0·089 for 1-phenyl-3:5 dimethyl-4-nitroso-pyrazole (J. 55), 0·2 for 1-(4-chlorophenyl)-3:5-dimethyl-4-nitroso-pyrazole (J. 49), 0·37 for 8-hydroxyquinoline sulphate, 0·39 for 2:3-dichloro-1:4-naphthaquinone (50 per cent.), 0·74 for standard laboratory Bordeaux mixture, 0·88 for 54 per cent. glyoxalidine acetates plus lime, 2·8 for lime-sulphur, and 4 for copper 8-quinolinolate [cf. ibid., 29, p. 102].

In precision spore germination tests with the horizontal sprayer technique, the spores being tested against dried fungicide residues on the slides, the fungicidal values obtained, taking that of lime-sulphur as unity, were: standard laboratory Bordeaux mixture 4, 8-hydroxyquinoline sulphate 14·9, 50 per cent. 2:3-dichloro-1:4-naphthaquinone 28·2, phenyl mercury chloride 111·1, copper 8-quinolinolate 12·8, and glyoxalidine acetates 2·7. The evidence suggests that there may be wide differences among fungicides in availability of actual toxicant from dried spray deposits.

The following materials, added to potato dextrose agar at the rate of 100 p.p.m., completely inhibited mycelial growth of *S. laxa*: phenyl mercury chloride, 8-hydroxyquinoline sulphate, sodium pentachlorphenate, sodium DNC malachite green, and J. 55. When tested at lower concentrations they all showed good fungistatic properties, phenyl mercury chloride, malachite green, and sodium pentachlorphenate reducing mycelial growth by 50 per cent. at concentrations of 1 to 2 p.p.m. In this experiment many materials which had been highly fungistatic to germinating spores were relatively ineffective against a mycelial growth on agar. Such were glyoxalidine acetates, lime-sulphur, 2:3-dichloro-1:4 naphthaquinone, and N-trichloromethyl-thiotetrahydrophthalimide. Copper sulphate at 100 p.p.m. stimulated the fungus.

Hockey (J. F.). **Grey mould wilt of Raspberry.**—*Sci. Agric.*, 32, 3, pp. 150–152, 1 pl., 1952.

Studies at the Dominion Laboratory of Plant Protection, Kentville, Nova Scotia, Canada, showed that *Botrytis cinerea* was responsible for the weakening and death of raspberry canes [*R.A.M.*, 6, p. 740] at Truro, Nova Scotia, during the summers of 1942, 1943, and 1947, the fungus being isolated easily late in the season. In 1948 six young plants brought to the greenhouse from a planting in which the disease had not been found were sprayed with a spore suspension and in 1949 strong canes growing in the greenhouse were inoculated. In both tests light brown to tan discoloured areas, which later spread up and down the stem, developed first around the stem at the bases of infected petioles. Dark blotches 1 to 2 mm. wide and from 2 to 15 mm. long appeared in these areas during the latter part of the summer and developed into sclerotia. When the adjacent nodes were infected the areas gradually coalesced. The most severely infected canes were killed before spring; the others survived with the fungus overwintering in them as subepidermal sclerotia. After a period of rainfall and high humidity, conidia, which are apparently the only source of infection, were found on these sclerotia as well as on those that had fallen to the ground.

The disease, which was observed only in plantings under a sawdust mulch, is most prevalent during wet seasons and can only be controlled by eradicating and burning the affected canes during the late summer and early autumn.

Pitcher (R. S.). **Observations on the Raspberry cane midge (Thomasiniana theobaldi Barnes). I. Biology.**—*J. hort. Sci.*, 27, 2, pp. 71–94, 3 pl., 2 figs., 8 graphs, 1952.

Pitcher (R. S.) & Webb (P. C. R.). **Observations on the Raspberry cane midge (Thomasiniana theobaldi Barnes). II. 'Midge blight', a fungal invasion of the Raspberry cane following injury by T. theobaldi.**—Ibid., 27, 2, pp. 95–100, 2 pl., 1952.

Studies at East Malling Research Station showed that first-year raspberry canes develop three distinct types of natural longitudinal split. Type 1 occurs first in late April, reaches a maximum in May, and ends by June. It is the shallowest type, involving the epidermis and two or three outer layers of the cortical parenchyma. Type 2 is a simple type of split penetrating radially from epidermis to pith; it widens and fills with callus. Type 3 occurs first at the cane bases in mid-June, extends rapidly upwards in July and August, and ceases in September. The early splits are morphologically similar to type 1, but later all the cortical parenchyma cells are involved and become clearly separated from the periderm. The split tissue remains in closer contact with the underlying cells than in type 1 and being thicker tends to remain green longer and to be even more suitable for development of the cane midge (*Thomasiniana theobaldi*) [*R.A.M.*, 28, p. 340].

In 1947–8 observations showed that a resistant variety, such as Landmark, escapes severe midge attack by providing no type 1 splits, and therefore allowing only a small generation 1 and so limiting the population for a year. As type 3 splits are few there is only a small vulnerable area for generation 2. This provides an effective defence even when the cane is exposed to a high population of midges, as when it is growing next to a susceptible variety, such as Malling Enterprise.

Three years' studies on host range showed that raspberry and loganberry are preferred for oviposition and are more suitable for larval development than any other hosts. In the field loganberry splits little and is seldom attacked. Himalaya Giant blackberry and rose are possible hosts but do not split freely and cannot support large populations in the field. Wild and cut-leaf blackberries are suitable for oviposition but fail to nourish the larvae.

Three fungi isolated consistently from lesions within the feeding areas of midge larvae, *Leptosphaeria coniothyrium*, *Didymella applanata*, and *Fusarium culmorum* [loc. cit.], proved capable of producing similar lesions when re-inoculated into young canes. *L. coniothyrium* was usually less prevalent than the others, but caused more damage. *F. culmorum* predominated on Newburgh, but no other variety studied (including Norfolk Giant, Lloyd George, Hercules, Park Lane, Chartham, and a range of Malling Seedlings) showed a marked susceptibility to any one pathogen. The lesion caused by *D. applanata* on larval feeding areas is much deeper than that caused by the same fungus on the spurs; in larval feeding areas the lesion frequently penetrates to the pith and kills the cane, as do the other two pathogens. The apparent failure of *D. applanata* to penetrate the undamaged periderm was confirmed by comparing the progress of artificial inoculations made (1) by rubbing the bark with a pycnidiospore suspension containing carborundum powder, (2) depositing mycelium on a light surface scalpel abrasion, and (3) inoculating a deep scalpel cut with pycnidiospore suspension or mycelium. Ten canes were inoculated by each method, the wound being covered with cellophane for seven days; spore suspensions were not washed and culture medium was not removed from the mycelium. Methods 1 and 2 gave 19 spur-blight type lesions and one failure, while the 20 deep inoculations all produced serious lesions,

11 of the canes later succumbing. The injury caused by midge larvae is thus comparable in effect to deep inoculation.

Horn (N. L.). **Strawberry fungicide screening tests.**—*Plant Dis. Reptr*, 36, 8, pp. 309–310, 1952. [Multilithed.]

A fungicide screening test including 41 treatments replicated four times was conducted at the Louisiana State University Experiment Station to obtain a fungicide applicable before fruiting to reduce strawberry fruit rot caused mainly by *Botrytis cinerea* [*R.A.M.*, 31, p. 441]. Klondike plants were used and every fungicide was applied with a 3 gal. Hudson sprayer at the rate of 270 gals. per acre, applications being made on 15, 22, and 29th January and 5, 12, 18, and 25th February. The best results were given by orthocide 406 [loc. cit.], DHA-S [ibid., 30, p. 183], and crag 5400 [ibid., 31, p. 181], with 9·9, 14·1, and 12·9 per cent. infection, respectively, as against 26·5 per cent. for the untreated. Orthocide 406 at 6 lb. per 100 gals. was the best treatment and seemed to stimulate the plants.

About seven weeks after the initial application the fungicides began to lose their effectiveness and half the area was sprayed with DHA-S, which is non-toxic to human beings and could be used during the picking season. Used at the rate of 40 gm. (97 per cent. active ingredient) per gal. the material was slightly toxic to the foliage. One application gave significant control in three replications.

When green to white berries were dipped into combined suspensions of conidia and fungicides the three materials allowed, respectively, 13·3, 24·2, and 35·8 per cent. rot, as compared with 84·2 and 60·3 for the inoculated and uninoculated controls, respectively. A possible recommendation for Louisiana would be to use orthocide 406 until fruiting, followed by DHA-S, if necessary, after harvesting has begun.

Miller (P. W.). **Relation of temperature to persistence of Strawberry yellows virus complex in Strawberry aphid.**—*Plant Dis. Reptr*, 36, 8, pp. 311–312, 1952. [Multilithed.]

In experiments at Oregon Agricultural Experiment Station viruliferous aphids (*Capitophorus* [*Pentatrichopus*] *fragaefolii*), fed for 13 days on strawberry plants with severe yellows [cf. *R.A.M.*, 31, pp. 246, 499], were transferred to two Petri dishes kept at 40° and 70° F., respectively. After periods of 5, 23, 43, 69, 95, and 141 hours' fasting batches of ten aphids at each temperature were transferred to ten healthy *Fragaria vesca* (East Malling strain) plants, on which they were allowed to feed for five days. A third lot of aphids was transferred directly from a Marshall plant with severe yellows to ten healthy *F. vesca* plants (ten aphids per plant). The results demonstrated that the components of the strawberry yellows virus persisted three to four days longer in the body of the aphid at 40° than at 70°. The aphids also lived correspondingly longer without food at 40° than at 70°. To determine the absolute limits of persistence of the various virus components their persistence in the aphid's body should be re-investigated at relatively low temperatures.

Fulton (R. H.) & Grigsby (B. H.). **The effect of several soil treatments on mummy berry disease of Blueberries in Michigan.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 34, 3, pp. 297–302, 1952.

In this account of control of *Vaccinium* mummy disease (*Monilinia* [*Sclerotinia*] *vaccinii-corymbosi*) [*R.A.M.*, 28, p. 407] in Michigan by various soil treatments a brief description of the symptoms [ibid., 4, p. 610] is included. The fungus, which overwinters in infected berries on the ground from the previous season, becomes active early in the spring, and during wet or rainy conditions its spores are carried to blossoms and young fruits which become tan or cream, hard, and worthless.

Wilting, browning, and ultimate death of the new shoots are the first signs of infection. Spraying with krenite-26 (sodium-DNC, E.I. Du Pont de Nemours Co.) at 1 and 2 gals. per 100 gals. and premerge (alkanolamine salt of dinitro-*o*-sec-butylphenol, Dow Chemical Co.) at about 1½ qt. per 100 gals. gave definite control, the number of infected berries per bush being 2·33, 1·14, and 1·75, respectively, against 11·53 for the untreated, the figures for 150 to 200 lb. aero dust (an oil-treated, finely powdered form of calcium cyanamide, American Cyanamid Co.) being 3·22 and 31·13 (untreated). All resulted in yield increases. Under certain conditions calcium cyanamide may cause serious injury to bush or fruit and excessive soil alkalinity. Control was better on mid- to late-season varieties, such as Rubel, Rancocas, and Stanley, with an average of less than six infected berries per bush, than on the early-maturing Adams (160 to 187 infected berries per bush). An earlier treatment, however, would probably have reduced much of the infection in the latter. Further investigations and details are needed before making any recommendations.

Fulton (J. P.). **A Tobacco necrosis virus associated with Strawberry plants.**—*Plant Dis. Reptr*, 36, 8, pp. 313–314, 1952. [Multilithed.]

In studies at the Agricultural Experiment Station, University of Arkansas, Fayetteville, tobacco necrosis virus [cf. *R.A.M.*, 31, pp. 218, 317] was obtained from the roots of a *Fragaria vesca* (East Malling clone) plant showing virus symptoms resembling those of a combination of the 1 and 2 viruses of Demaree and Marcus [ibid., 31, p. 288]. The virus was also obtained from apparently healthy East Malling clone plants and from Blakemore plants grafted to them. On Pinto bean [*Phaseolus vulgaris*] test plants the virus produced necrotic local lesions [ibid., 31, p. 317]. Local lesions were also produced on Blackeye cowpeas, Landreth, Contender, and Black Valentine snap bean [*P. vulgaris*], tobacco, cucumber, squash, cantaloupe, maize, and oats. No systemic symptoms appeared on any host. The thermal inactivation point was above 80° C. In other respects the virus acted in a manner similar to that described for tobacco necrosis [ibid., 14, p. 797; 29, p. 539]. Consistent results were obtained only from November to February in a greenhouse maintained at 65° F.

It was assumed that the virus was introduced into the greenhouse in the plants of the East Malling clone, as it was rather constantly associated with these plants or plants grafted to them. It was rarely obtained from other strawberry plants in this greenhouse or from the field. Experiments failed to demonstrate that it was carried in the potting mixture or water. It readily passes on to runner plants either through plant tissue or by contamination. It was obtained from strawberry leaves once.

When runners from the East Malling clone were rooted in steam-sterilized soil, some runners being grafted to runners of *F. virginiana* that had been consistently free from tobacco necrosis virus, after two weeks the virus was obtained from only the East Malling clone mother plants, while after one month it was obtained from East Malling clone daughter plants and from mother and daughter plants of the grafted *F. virginiana*. Ungrafted *F. virginiana* plants in the same area remained unaffected. While these results do not necessarily show that the virus passed from plant to plant only through the tissue union, they demonstrate that the passage of virus from plant to plant is facilitated by this close proximity.

1950 summary of results of fungicide tests on crops other than fruit trees.—*Plant Dis. Reptr, Suppl.* 210, pp. 1–19, 1952. [Multilithed.]

The results of fungicide tests conducted throughout the United States in 1950 [*R.A.M.*, 30, p. 52 and next abstract] are summarized from reports submitted by numerous contributors. Separate sections are devoted to results with vegetables

(diseases, treatments, order of control, and overall preference) under the popular names of the hosts, arranged alphabetically, results of soil fumigation tests with a short section on fungi, results with ornamentals and shade trees, and with miscellaneous plants.

Mills (W. D.). **1950 summary of results of fungicide tests on fruit and nut trees.** —*Plant Dis. Reptr, Suppl.* 210 (continued), pp. 23-31, 1952. [Multilithed.]

The results of fungicide tests on fruit and nut trees conducted throughout the United States in 1950 [see preceding abstract] are summarized.

Miller (P. R.). **Selection and application of fungicides.**—*Agric. Chemic.*, 7, 2, pp. 65, 67, 69, 1952.

These tabulated results of fungicide tests for the control of potato and tomato late blight [*Phytophthora infestans*], tobacco blue mould [*Peronospora tabacina*], and cucurbit downy mildew [*Pseudoperonospora cubensis*] in various parts of the United States in 1951 have already been noticed from another source [*R.A.M.*, 31, p. 226].

Andrén (F.). **Riktlinjer av prövning av fungicider.** [Guiding principles in the testing of fungicides.]—*Nord. JordbrForskn., 1951*, 2–3, pp. 496–499, 1951.

In this paper, presented at the eighth congress of the Scandinavian Agricultural Research Workers' Association, held in Helsinki in June, 1950, the author describes the methods employed by the Swedish plant protection authorities in the evaluation of fungicides for the control, *inter alia*, of seed-borne diseases of cereals [see above, p. 73], potato blight [*Phytophthora infestans*: *R.A.M.*, 31, pp. 80, 511], and fruit tree diseases, exemplified by apple scab [*Venturia inaequalis*: ibid., 30, p. 374].

Hough (W. S.) & Mason (A. F.). **Spraying, dusting and fumigating of plants. Revised edition.**—ix+726 pp., 227 figs., 13 diags., 1 graph, New York, The Macmillan Company, 1951. $12.00.

The many advances in the field of pest control since the publication of the first edition of this treatise (by A. F. Mason) in 1928 have necessitated a virtual rewriting of the text, which comprises two parts, I—principles and II—applications. Among the 11 chapters in part I may be mentioned (I) development of pest control on plants (pp. 1–26); (III) fungicides (pp. 103–131); (IV) miscellaneous spray ingredients, pesticides, and compatibility, accompanied by a chart (pp. 132–149); (V) spraying and dusting machines (pp. 150–204); (VI) construction and operation of spraying and dusting equipment (pp. 205–264); (VIII) soil treatment for control of insects, diseases, and weeds (pp. 304–336); and (XI) seed treatment (pp. 397–418).

Chapters XII to XIX of the ten in part II deal, respectively, with the troubles of orchard fruit, bush fruit and strawberries, grapes, cranberries, citrus, vegetable and truck crops, cotton, and tobacco, each being furnished with one or more diagnostic keys.

Johansson (N. O.). **Antibiotika och växtskydd.** [Antibiotics and plant protection.] —*Växtskyddsnotiser, Stockh., 1952*, 2, pp. 17–20, 1 fig., 1952.

In laboratory experiments at the Swedish Plant Protection Institute, Stockholm, the growth of several plant pathogens was inhibited in varying degrees by the introduction into the cultures of an antibiotic known as PF, obtained from a bacterium of the *coli* type. Thus, at a concentration of 5 'units' per ml. (1 gm. PF = 10,000,000 units) it was effective against *Botrytis cinerea*; at 10 against *Sclerotinia trifoliorum*; at 25 against *Cercosporella herpotrichoides*, *S. fructigena*, and *S. sclerotiorum*; and at 50 against *Botrytis allii*, *Fusarium nivale* [*Calonectria nivalis*],

Rhizoctonia [*Corticium*] *solani*, *Ustilago nuda*, and *Verticillium albo-atrum*. However, attempts to make practical use of PF as a cereal seed disinfectant against *Calonectria nivalis* and for the sterilization of soil infested by *Corticium solani* were unsuccessful even at 1,000 'units' per ml.

Dodge (B. O.). **The fungi come into their own.**—*Mycologia*, 44, 3, pp. 273–291, 1 pl., 1 fig., 1952.

In this lecture to the Mycological Society of America, delivered at Columbus, Ohio, on 12th September, 1950, the author reviews some recent outstanding achievements in mycology, with a note on bacteria and bacteriophages.

Chevaugeon (J.). **Maladies des plantes cultivées en Moyenne-Casamance et dans le Delta Central Nigérien.** [Diseases of cultivated plants in Middle Casamance and the Central Niger Delta.] –*Rev. Path. vég.*, 31, 1, pp. 3–51, 55 figs., 1952.

Notes based on a visit paid from August to November, 1951, are given on diseases of cultivated plants in Middle Casamance [Senegal] and the Central Niger Delta [French Sudan]. Sorghum in Casamance is attacked by *Helminthosporium turcicum* [cf. *R.A.M.*, 31, p. 536], *Ascochyta sorghina* [cf. ibid., 13, p. 746], and *Colletotrichum graminicola* [cf. ibid., 24, p. 442], while in the French Sudan it is attacked by these and by *Gloeocercospora sorghi* [cf. ibid., 24, pp. 442, 443], *Ramulispora sorghi* [cf. ibid., 25, p. 392; 27, p. 158], *Sphacelotheca sorghi* [C.M.I. map No. 220], *S. cruenta* [cf. *R.A.M.*, 31, p. 33], and, possibly, *S. holci-sorghi*. In the Circle of Sédhiou (Casamance) *H. turcicum* attacks as soon as sowing is completed; failure to emerge is largely due to it. *S. sorghi* is common throughout the irrigated part of the French Sudan. At Sahel the hybrids sorghum × Sudan grass are unaffected. Covered smut (*Tolyposporium penicillariae*) [C.M.I. map No. 150] of millet [*Pennisetum* sp.] appears to be as prevalent in Senegal as in the French Sudan and may appreciably reduce yields. Virescence of millet caused by *Sclerospora graminicola* [cf. *R.A.M.*, 28, p. 625] is very prevalent in the Molodo sector (Niger), but is of negligible importance. All varieties of millet grown in 1951 at Séfa Experiment Station, Casamance, were attacked by *Balansia claviceps* [ibid., 10, p. 450; cf. 31, p. 476]. Maize is attacked by *H. maydis* [*Ophiobolus heterostrophus*: cf. ibid., 18, pp. 245, 444] in Casamance, but the disease is less serious than in Togoland or Dahomey, appearing during September on late-sown maize, especially on the American hybrid Hickory. *H. oryzae* [*O. miyabeanus*: C.M.I. map No. 92] is present in every rice field in Casamance between Ziguinchor and Diana Malary, but is nowhere serious. It also occurs in the Niger district of the French Sudan, in the Kayo sector, near the river, and in Molodo. It is less common to the north in the experimental plots at Kagoni, where rice growing has only recently been introduced. *Piricularia oryzae* [ibid., No. 51] is rare in native rice plantations in Casamance; maximum infection occurs late and breaking of the ear is exceptional, only occasional seeds aborting. Other fungi found on rice included *Curvularia lunata* [cf. *R.A.M.*, 17, p. 98] (Central Niger Delta and Middle Casamance), *C.* group *geniculata*, and *Phyllosticta glumarum* (both Delta only).

Voandzeia subterranea is attacked by *P. voandzeiae* [cf. ibid., 9, p. 135] in Casamance and the French Sudan, and by *Corticium solani* in Casamance. In some experimental plots at Séfa *Crotalaria retusa* was completely killed by *C*[*orticium*] *rolfsii*. Beans [*Phaseolus vulgaris*] there and at Soninkoura Station (on the right bank of the Niger) are attacked by *Colletotrichum lindemuthianum* [cf. ibid., 29, p. 293, and C.M.I. map No. 177]. Collar rot of groundnut (*Corticium rolfsii*) [cf. *R.A.M.*, 8, p. 608] is a menace in the forest regions of Casamance, and infection by *Cercospora personata* [ibid., 15, p. 284 and C.M.I. map No. 152] and *C. arachidicola* [ibid., No. 166] becomes exceptionally intense at the end of the season owing to heavy rains. *C. personata* is found in the French Sudan where, as in Casamance,

it is frequently associated with a new species of *Colletotrichum* named *C. mangenoti*. This fungus causes grey-brown leaf spots which bear acervuli with conidia 13 by 3·75 (9·8 to 16·3 by 3·2 to 4·6) μ. A *Phyllosticta* [cf. *R.A.M.*, 4, p. 259; 7, p. 764] resembling *P. sojaecola* [cf. ibid., 31, p. 470] occurs on groundnut in Casamance.

Excess budding [cf. ibid., 24, p. 440] affects an important proportion of the cassava setts grown at Sédhiou, the crop being greatly reduced. In an experimental plot at Séfa about 10 per cent. of the slips died in three or four weeks, as the result of a rot associated with *Botryodiplodia theobromae*. *Corticium rolfsii* attacked the plants at ground level and *Hypomyces haematococcus* var. *breviconus* [cf. ibid., 29, p. 470] developed on the underground parts. *Botryosphaeria ribis* and *Dothiorella* sp. were occasionally present, but neither penetrated the wood rapidly enough to prevent budding entirely. The slips that rooted budded late but prolifically. Every bud gave rise to a branch which, however, remained short. The adult leaves were small, the lobes narrow, and the veins thick, greenish-white or yellowing. The interveinal areas were pale green, and later chlorotic with a mosaic; finally, somewhat angular, red-brown necrotic lesions bordered by a very narrow brown-black line appeared. The affected areas were very thin. These symptoms became less conspicuous as the plants aged; the leaves appeared normal but were very close together and the axillary buds produced small though normally constituted leaves. The affected plants were dwarfed and bushy. The condition was most prevalent in places where stagnant water had collected after heavy rain. *Ragnhildiana manihotis* [*Cercospora caribaea*: ibid., 20, p. 445] is very common in the forest areas of the Ivory Coast, but was not found in Casamance. The only species of *Phyllosticta* on cassava found in Casamance was *P. manihot*. Two major diseases attack the host on the banks of the Niger: cercosporiosis (*C. henningsii*) [ibid., 29, p. 400] and necrosis of the branches (*Glomerella manihotis*) [ibid., 30, p. 213]. *C. henningsii* becomes progressively less frequent in areas more and more remote from the river, and from Missibougou (588 mm. rainfall) onwards was no longer found. In the French Sudan the leaves of *Jatropha multifida*, botanically very close to *Manihot*, were attacked by *P. manihoticola*. In Casamance castor [*Ricinus communis*] was affected by *Alternaria ricini* [cf. ibid., 30, p. 510]. *A. dauci* f. *solani* [*A. solani*: ibid., 25, p. 581; C.M.I. map No. 89] attacks tomatoes throughout their vegetative period in Casamance but on the banks of the Niger appears only towards the end of this period. Chilli pepper in Casamance and in the French Sudan, especially at Soninkoura and Missibougou, is infected by *Colletotrichum nigrum* [*G. cingulata*: cf. *R.A.M.*, 17, p. 346; 32, p. 37].

Cotton in Casamance was commonly infected by the sclerotial form of *Corticium solani* [cf. ibid., 20, p. 162; 24, p. 414]. Anthracnose of the bolls (*G. gossypii*) was not common in Casamance at the end of September, but appeared likely to become so later. *A. macrospora* [cf. ibid., 28, p. 31] occurs on young American and Egyptian cotton in Casamance and the French Sudan.

A newly planted citrus orchard at the Experiment Station, Séfa, was attacked by collar and root rot caused by *Sphaerostilbe repens* [cf. ibid., 7, p. 225]. Lemon trees introduced into Lower Casamance from Algeria developed leaf spot and drying of the shoots due to *Colletotrichum gloeosporioides* [*G. cingulata*: cf. ibid., 14, p. 428; 17, p. 106]; only those which failed to take root or became attacked by *S. repens* were affected. Stem cankers bore pycnidia of *Diplodia natalensis*. Gummosis of lemon trees (*Phytophthora* sp.) was found only at Soninkoura where it was very prevalent. Dead branches of orange, lemon, and grapefruit trees in an orchard in the same locality bore pycnidia of *Phomopsis* [*Diaporthe*] *citri* [C.M.I. map No. 126]. Date palms at Kayo and Niono, on the left bank of the Niger, were widely affected by *Graphiola phoenicis* [*R.A.M.*, 16, p. 23]. At Séfa nearly 2 per cent. of the sisal leaves, mostly the lowest ones, were infected by *Coniothyrium concentricum* var. *agaves* [cf. ibid., 25, p. 394].

Rautavaara (T.). **Myrkyllisiä ja myrkyllisiksi luultuja sieniä.** [Poisonous fungi and fungi believed to be poisonous.]—*Karstenia*, 1, pp. 15–47, 1 fig., 1950. [English translation, pp. 37–46.]

The author defines poisonousness in fungi [*R.A.M.*, 28, p. 268] and gives notes on reports of it in the literature (74 titles), the nature of the poisonous substances present, the characteristics of poisonous fungi, the problem of rendering such fungi harmless by salting, etc., and types of fungal poisoning. An annotated list of those found in Finland and mentioned in the existing literature as poisonous or doubtful is given. Virtually only one unconditionally poisonous fungus occurs in Finland, *Amanita virosa*.

Kaplan (L.). **Studies on fungal membranes.**—*Proc. Iowa Acad. Sci.*, 58, pp. 165–171, 1951. [Received November, 1952.]

This study in the Department of Botany, University of Chicago, represents an attempt to combine purification procedures with established methods of detecting cellulose and chitin in the walls of mycelial mats of a group of organisms consisting mostly of the higher fungi. It was shown that a chitinous basic membrane closely combined with other components is characteristic of the higher fungi and that cellulose may occur infrequently in conjunction with this material.

Cohen (M.) & Yarwood (C. E.). **Temperature response of fungi as a straight line transformation.**—*Plant Physiol.*, 27, 3, pp. 634–638, 3 graphs, 1952.

The authors have investigated the possibility of expressing the relation of temperature to fungal growth, usually expressed as a curve graphically, as a straight line in a manner similar to that used by Bliss (*Science*, 79, pp. 38–39, 1934) in toxicological studies. With a curve it is difficult to express these temperature relations briefly and to compare one organism with another.

It is assumed that the temperature-growth response curves for fungi are basically of the same type and an average curve was constructed from 16 arithmetic temperature-growth response curves. This was converted into a straight line graph by drawing a line from the average minimum temperature point through the average optimum point until it intersected a vertical erected at the average maximum temperature. Details are given of the method of construction of a new vertical scale for percentage growth at the optimum. The advantage of this method is that the minimum and maximum temperatures stand out and the optimum is clearly defined for each organism. Differences between organisms are clearly apparent and more lines can be arranged in the same space without confusion. If this scale is shown to be applicable to all organisms, then it is possible that only two points (e.g. minimum and maximum, or minimum and optimum temperatures) need to be determined experimentally, all other values being derived from the graph with a reasonable degree of accuracy.

Two basic weaknesses are noted, firstly the possibility that colony diameter measurements do not represent the true growth, and secondly that growth in Petri dishes is distorted by staling and other effects. If such errors prove valid the authors point out that the empirical scale could be readily altered to correct them.

Dye (M. H.) & Vernon (T. R.). **Air-borne mould spores.**—*N.Z. J. Sci. Tech.*, Sect. B, 34, 2, pp. 118–127, 9 graphs, 1 map, 1952.

During a two-year survey of air-borne mould spores in New Zealand by exposing two 100-mm. Petri plates for five minutes every week in 23 localities, a total of 44,597 fungi was collected on 2,935 plates. They represented 38 genera, but the majority (94·2 per cent.) belonged to *Cladosporium* [*R.A.M.*, 30, p. 56; 31, p. 619], *Stemphylium* [ibid., 31, p. 567], *Epicoccum* [ibid., 12, p. 32], *Pleospora* [loc. cit.],

Penicillium [ibid., 31, pp. 134, 567], *Alternaria* spp. [loc. cit.], and pycnidial forms, and they were also the most widely distributed. Atmospheric mould spore numbers were highest in the summer, 50 to 200 colonies per plate having been collected frequently during the warmer months, and lowest in winter. With the exception of *Penicillium*, all the above-mentioned genera showed seasonal variation in spore deposit. The lowest total count occurred at Hokitika where there is a very high annual rainfall.

Berridge (N. J.) & Barrett (J.). **A rapid method for the turbidimetric assay of antibiotics.**—*J. gen. Microbiol.*, 6, 1–2, pp. 14–20, 4 graphs, 1952.

The following rapid method for assaying the bactericide nisin was developed at the National Institute for Research in Dairying, University of Reading. Dilutions are made of unknown samples in powers of 2 in 0·01N hydrochloric acid, including in each batch at least one set of tubes containing a standard solution diluted in powers of 1·5. Each tube is 'inoculated' with six volumes of a culture of *Streptococcus agalactiae* in the logarithmic phase of growth and incubated for 30 minutes at 40° [C.], after which growth is halted and the optical densities of the suspensions are determined. Graphical comparison between unknown and standard tubes gives the nisin content of the former. Penicillin, streptomycin, aureomycin, and gramicidin caused a qualitatively similar response in the test organism.

Perrin (E. E.). **Copper 3-phenylsalicylate—a textile preservative.**—*Rayon synth. Text.*, 33, 4, pp. 78, 80, 1952.

Recent tests by the Dow Chemical Company and other industrial laboratories have demonstrated that copper 3-phenylsalicylate is a non-irritating, non-sensitizing fungicide and bactericide. It has been approved as an alternate material for use in United States Government Specification JAN-D-504, relating to the dyeing and after-treating processes for duck and twill, which prescribes the use of 1·25±0·25 per cent. copper-3-phenylsalicylate on the weight of the finished fabric. The compound should prove important as a preservative for tents, tarpaulins, and outdoor canvas and duck equipment in general, being very efficient in the control of [unspecified] mildew and organisms causing decay of cotton fabric. Material treated with only 1 per cent. copper 3-phenylsalicylate and subjected to six months' outdoor exposure in southern Louisiana remained entirely free from mould growth, and breaking tests revealed no significant tendering effect on the fibres. In soil burial experiments the fabric was effectively protected against rotting fungi.

From 1 to 3 per cent. of the preservative should be applied to fabrics intended for industrial or private use. The following methods are recommended: (1) solvent application, (2) aqueous dispersions, and (3) two-bath aqueous process. In (1) the compound is dissolved in a mixture containing 85 parts by weight of an aromatic hydrocarbon with a boiling range of 250° to 350° F. and 15 parts by weight of dowanol 50 B or 93 B (Dow Chemical Co., Midland, Michigan), or n-butanol. The concentration of copper 3-phenylsalicylate should not exceed 10 per cent. of the solution weight. The material should be passed through this solution, with squeeze rolls controlling the pick-up, and then dried. For (2) the following formulation is suggested: 50 parts copper 3-phenylsalicylate, two parts of methocel 1500 ops. (Dow Chemical Co.), and 112 of cold water containing triton X-100. The methocel should be stirred rapidly into the water. In (3) the fabric is first passed through an aqueous solution of the sodium salt of 3-phenylsalicylic acid and then through a copper acetate or copper sulphate solution. The efficiency of the preservative can be prolonged by the use of certain resinous binders, or by water-repellent treatments on the fabric at a temperature not exceeding 275°.

Verdcourt (B.). **The effect of certain phenolic compounds on the germination and growth of microfungi.**—*Mycologia*, 44, 3, pp. 377–386, 3 pl., 1952.

Germination of *Aspergillus niger* spores [*R.A.M.*, 31, pp. 193, 340] on Czapek-Dox agar plates was inhibited by *p*-chlorophenol, 2:4 dichlorophenol, and sodium *o*-phenyl phenate all at 200 p.p.m., *o*-nitrophenol at 125 p.p.m., sodium pentachlorophenate and *p*-chlor-*m*-cresol at 100 p.p.m., 2:4 dinitrophenol at 50 p.p.m., *s*-tribromophenol at 20 p.p.m., and phenyl mercury acetate at 5 p.p.m. Phenol inhibited growth completely at 1,000 p.p.m., but at 750 p.p.m. most spores formed large giant cells. Both α- and β-naphthol were efficient inhibitors, 200 p.p.m. of the former and 120 p.p.m. of the latter preventing germination. Large giant cells developed on 80 p.p.m. β-naphthol agar, some more than ten times the diameter of a normal spore.

Shirk (H. G.), Poelma (P. L.), & Corey (R. R.). **The influence of chemical structure on fungal activity. I. Effect of *p*-chlorophenol and derivatives. II. Effect of *p*-chlorination of phenols.**—*Arch. Biochem., N.Y.*, 32, 2, pp. 386–396, 2 graphs, 1951.

At the Prevention of Deterioration Center, National Research Council, Washington, D.C., 18 *p*-chlorophenols were evaluated for fungistatic potency by the nutrient agar dish technique, using *Aspergillus niger* [see preceding abstract] as the test organism and including as an arbitrary standard the effective textile mildew-proofing agent G-4 [*R.A.M.*, 25, p. 515; 28, p. 75]. The substitution of any alkyl, cycloalkyl, or aryl group in the *p*-chlorophenol nucleus resulted in a significant enhancement of efficiency as compared with *p*-chlorophenol. The maximal growth-inhibitory response was indicated for the *o-tert*-amyl-, *o*-benzyl-, *o-tert*-butyl-5-methyl-, *o*-cyclohexyl-, and *o*-phenyl-*p*-chlorophenols. Over a 1,000-fold concentration range these five derivatives were somewhat more fungitoxic and sporicidal to *A. niger* than G-4, particularly through the 5×10^{-5} to 10^{-3} *M* dosage scale.

The fungistatic efficacy of nine *p*-chloro derivatives was three to ten times higher than that of G-4. The more toxic parent phenols, such as *o*-phenyl- and *o*-cyclohexyl-phenol, yielded on *p*-chlorination compounds averaging a threefold increase in potency, while the activity of the less inherently toxic, e.g., phenol, the cresols, and the xylenols, was increased approximately tenfold by the process.

Basu (S. N.) & Bhattacharyya (J. P.). **Mildew of complex vegetable fibres.**—*J. sci. industr. Res.*, 10 B, 4, pp. 91–93, 1951.

At the Indian Jute Mills Association Research Institute, Calcutta, *Chaetomium indicum* [see next abstract], *C. globosum* [loc. cit.; *R.A.M.*, 31, p. 569], *Aspergillus flavus*, *A. niger*, *A. terreus*, *A. sydowi*, and *Penicillium citrinum* were the fungi most frequently isolated from various vegetable fibres incubated at 100 per cent. relative humidity at room temperature. *C. indicum* was invariably present on the jute samples. Comparison with previous results [ibid., 30, p. 529] reveals a radical alteration in the frequency of certain species depending on experimental conditions, e.g., of humidity, temperature, light, and possibly the culture medium. Flax, *Phormium tenax*, *Hibiscus sabdariffa*, and a hybrid *Hibiscus* from Bangalore were relatively resistant to fungal infection.

Farrow (W. M.). **A study of Chaetomium in cellulose decay.**—*Proc. Iowa Acad. Sci.*, 58, pp. 101–106, 1951. [Received November, 1952.]

A study was made in the Department of Botany, State University of Iowa, of the ability of five strains of *Chaetomium globosum* to attack 12 oz. grey cotton duck [see preceding abstract] in comparison with 14 other species [*R.A.M.*, 24, p. 330]. The plate method was employed, using sterile nutrient solution; the strips were

inoculated with the selected organisms, and incubated for one week at 37° C. and 75 per cent. relative humidity. Cellulolytic activity was measured by the decline in tensile strength. The results indicated a distinct correlation between the growth rate and temperature and humidity. *C. atrobrunneum* [ibid., 29, p. 324], *C. indicum* [ibid., 30, pp. 39, 114, and preceding abstract], and *C. velutinum* [see above, p. 79], all originating from the tropics, were more active than any of the *C. globosum* strains. The latter, however, have a lower optimum and may be more active than the others at a lower temperature and humidity [ibid., 29, p. 474].

HADERT (H.). **DDT-haltige und andere fungicide Anstrichmittel.** [DDT-containing and other fungicidal coatings.]—*Farbe u. Lack*, 57, pp. 536–540, 1951. [Abs. in *Chem. Zbl.*, 123, 39, p. 6274, 1952.]

Mercury phenyl oleate and mercuric acetate, -chloride, and -nitrate at dosages of 0·3 per cent. are recommended for the control of [unspecified] mould development in coats of paint in Germany [*R.A.M.*, 31, p. 583]. Mercuric chloride may be used at 0·1 per cent. if due precautions are observed, while copper and iron naphthenates combine fungicidal efficiency with freedom from adverse effects on human health.

RAUTAVAARA (T.). **Kalkkitehtaan vaikutusta sienikasvillisuuteen?** [What is the influence of a lime factory on the fungus flora?]—*Karstenia*, 1, p. 85, 1950. [English summary.]

Observations in pine and spruce forests near a lime factory in Finland indicated that the fine dust spreading from the chimney probably causes anomalies in the local fungus flora. Many species normally characteristic of such sites, e.g., *Lactarius rufus* [cf. *R.A.M.*, 22, p. 104], *L. trivialis*, and *Boletus variegatus* [cf. ibid., 30, p. 427] were absent, while *Psalliota abruptibulba*, *Tricholoma nudum* [cf. ibid., 30, p. 580], *L. deliciosus* [cf. ibid., 29, p. 45], and *Clitocybe nebularis* [loc. cit.; cf. ibid., 29, p. 595], not usually found in such forest types, were abundant.

KING (L. W.). **Washington certified seed Potatoes.**—*Amer. Potato J.*, 29, 2, pp. 53–54, 1952.

An examination of potato 'seed' samples collected in 1945 from all the certified fields in Washington showed that despite careful dusting and roguing incidence of [unspecified ? virus] disease was high in many of these fields. Over 79 per cent. of the White Rose variety showed more than 3 per cent. disease and Netted Gem, imported mainly from Canada, was not up to its usual standard. DDT applications resulted in a general improvement and in 1947 86 per cent. of White Rose had less than 3 per cent. disease. The improvement has been steady in each crop; in 1950 the percentage of White Rose with less than 3 per cent. disease was up to 100, while 96 per cent. Netted Gem had less than 2 per cent. disease, 57 per cent. of the former and 78 per cent. of the latter variety being entirely free from infection. This cut the roguing costs down to the minimum and disease spread was checked by control of the insect vector. There was no leaf roll [*R.A.M.*, 30, p. 532] in any of the acreages in the Whatcom County, where White Rose was grown.

KLAPP (E.). **Zusammenhang düngungs- und bodenbedingter Standortsunterschiede mit Pfirsichblattlausbesatz und Nachbauwert der Kartoffel.** [Relation of site differences dependent on fertilizers and soil to Peach aphid colonization and progeny quality in the Potato.]—*Z. Acker- u. PflBau*, 93, 3, pp. 347–358, 1951. [Received September, 1952.]

In a continuous fertilizer experiment at Bonn-Poppelsdorf, Germany, in progress since 1905, the omission of potassium in the previous year has generally resulted in

the heaviest potato yields, until 1940–42 when the position was reversed. Counts in 1938 and 1950 of the peach aphid [*Myzus persicae*] revealed the maximum infestation in the plots not given potassium in the previous year [cf. *R.A.M.*, 31, p. 571]. The fact that heavy aphid colonization is not necessarily reflected in a high incidence of viroses in the progeny is attributed to disturbance or interruption of the relationship by nutritional-physiological factors. The sulphate is considered to be the most suitable form of potassium for use in seed potato production and a note to this effect should be included in the rules for certification. Symptoms simulating those of viroses have been observed to develop both in plots with severe potassium deficiency and in those supplied with excess chloride and sodium.

Haine (Else). **Zur Frage der Überwinterung von Myzodes persicae Sulz. an Sekundärwirten. I. Das Vorkommen der grünen Pfirsichlaus an Wintergemüse der Kölner Bucht und ihrer Randgebiete im ausgehenden Winter 1948/49. II. Myzodes persicae Sulz. und andere an Kartoffeln vorkommende Aphiden in den Gewächshäusern von Bonn.** [On the question of the overwintering of *Myzodes persicae* Sulz. on secondary hosts. I. The occurrence of the green Peach aphid on winter greens in the inlet of Cologne and the bordering regions at the close of the winter 1948–9. II. *Myzodes persicae* Sulz. and other aphids occurring on Potatoes in Bonn greenhouses.]—*Anz. Schädlingsk.*, 23, 6, pp. 81–86, 2 graphs, 1950; 24, 7, pp. 97–103; 8, pp. 120–122, 1951.

During the severe and protracted cold spell experienced in the Cologne region of Germany during the winter of 1948–9, Savoy and green cabbages, Brussels sprouts, mangold, and rape were found to serve as outdoor hosts of *Myzodes* [*Myzus*] *persicae* [*R.A.M.*, 31, pp. 348, 624]. The results are given of an inspection of greenhouses in eight nurseries at Bonn at various times of year from 1947 to 1949 to determine the distribution of potato virus vectors on ornamentals [cf. ibid., 31, p. 369].

Marini (Enrica). **La frequenza del virus X e del virus dell' accartocciamento nelle Patate d'importazione o riprodotte in Italia e in alcune razze italiane.** [The frequency of virus X and leaf roll virus in Potatoes imported into or multiplied in Italy and in certain Italian lines.]—*Notiz. Malatt. Piante, 1951*, 17, pp. 16–34, 1951. [English summary, p. 69. Mimeographed.]

A list is given of potato varieties imported into Italy by way of Como and found to be free from virus X: ten out of 11 from Germany, one out of eight from Holland, one out of four from Denmark, one out of one from Luxembourg, and four out of six from Czechoslovakia.

The places of origin are given of imported potato lines grown in Lombardy and other parts of the country and found to be infected with virus X [cf. *R.A.M.*, 15, p. 458]. The virus was almost constantly present in tubers of Italian lines or lines known as such, including Bianca di Como and Bianca di Erto-Casso, and also occurred in other lines, such as Quarantina di Cuneo. Among the progeny of Tonda di Berlino (Allerfrüheste Gelbe) virus X was present only once in the tubers and not at all in the tops, though the virus was found in the leaves of plants of this variety grown in the province of Como.

The incidence is given of leaf roll virus [cf. ibid., 14, pp. 328, 786] in the imported lines grown in an infested area near Milan where insecticidal spraying was not practised.

Akeley (R. V.), Lombard (P. M.), & Stevenson (F. J.). **Blight-resistant Potato varieties can save copper and cut cost of production.**—*Amer. Potato J.*, 29, 2, pp. 49–52, 1952.

It is estimated that the planting of potato varieties highly resistant to blight

(*Phytophthora infestans*) [*R.A.M.*, 31, p. 628] in all the potato-growing areas of the United States would save much of the 50,000,000 lb. of copper sulphate used for the control of the disease. In 1949 and 1950 in Maine, Kennebec [loc. cit.] yielded as well when untreated as when sprayed with Bordeaux mixture once a week during the growing season, the fungicide decreasing rather than increasing the yields. In the former year plots were inoculated with *P. infestans* on 14th July and a heavy infestation of the disease was soon prevalent on the susceptible varieties. With Menominee, which is intermediate in resistance between Kennebec and the susceptible Green Mountain, there was no significant difference in yield between the untreated plots and those sprayed with Bordeaux or with DDT. In 1950 a heavy blight epidemic occurred on the border rows of the untreated Teton variety, while Kennebec plots gave the same results as in 1949.

Waggoner (P. E.). **Distribution of Potato late blight around inoculum sources.**—*Phytopathology*, 42, 6, pp. 323–328, 1 diag., 3 graphs, 1952.

At the Connecticut Agricultural Experiment Station in 1949 and 1950 the spatial distribution of diseased Cobbler potato leaflets round three isolated sources of *Phytophthora infestans* sporangia was observed at approximately weekly intervals [cf. *R.A.M.*, 18, p. 814; 22, p. 400]. The maximum dispersal of the pathogen, as traced by blight development, occurred in the direction of air movement. Primary infection was limited to a radius within 10 m. of the source. The disease gradient was flattened by secondary infection. Early attacks were largely confined to the lower leaves, whereas later ones involved the upper as well. Following virtual extinction in one of the plots during an unpropitious weather period in 1950, the fungus spread widely on the recurrence of more favourable conditions.

A modification of Gregory's mathematical model for the deposition of air-borne spores [ibid., 24, p. 378] permitted an accurate interpretation of the observations on primary infection in terms of sporangial dispersal, especially over protracted periods. The rate of sporangial deposition was accelerated by an increase in downward velocity through air movement or by suspension in water droplets. Weather conducive to blight development evidently operated in two ways to increase infection; firstly, the number of sporangia produced per lesion was raised, and secondly, their pathogenic efficiency was enhanced.

On the basis of the spore deposition hypothesis, the probability of a leaflet contracting infection at a distance of 10 m. from a source similar to the one of 1949 is about 1 in 1,000, whereas at one mile the corresponding figure would be less than 1 in 10,000,000 for deposition on a leaflet or slide. The probability of infection from sporangia deposited at a distance from the source must be sharply reduced by a non-saturated atmosphere.

Richardson (J. K.). **The influence of tuber development on scab infection in Katahdin Potatoes.**—*Phytopathology*, 42, 6, pp. 297–298, 1 fig., 1952.

At the Dominion Laboratory of Plant Pathology, St. Catharines, Ontario, Katahdin potato plants with variously sized tubers were transplanted from sterilized soil to a sandy field heavily infested with scab [*Actinomyces scabies*]. The tubers produced in the contaminated soil and those that increased in size after transplanting developed typical lesions [cf. *R.A.M.*, 3, p. 60]. On the transplanted tubers infection occurred only in the area of enlargement and its severity was directly related to tuber growth [ibid., 5, p. 574]. In 1949 and 1950 the average incidence of scab on tubers initiated after transplanting was 16·9 and 16·4 per cent., respectively; on those that did not expand after transplanting, 0·0 and 0·8; on those increasing by 1 in. or less, 0·3 and 3; between 1 and 2 in., 7·2 and 12·9; and over 2 in., 15·6 and 10·8.

Tixier (P.). **The injection of trace elements, especially of copper in the form of sulphate, into the Hevea brasiliensis tree.**—*J. Rubb. Res. Inst. Malaya*, 13, Communication 276, pp. 192–199, 1951. [Received June, 1952.]

In this paper read at the Latex Symposium, held at the Rubber Research Institute, Malaya, 19th to 21st February, 1951, the results of experiments in Indo-China from 1949 to 1950 are given. They indicated that copper sulphate injections (*Rev. gén. Caoutch.*, 27, pp. 524, 591, 663, 1950) caused a definite increase in the weight of rubber produced over a period exceeding three months and usually lasting for five or six. The trees treated in December, 1949, were re-injected in June, 1950, and again six months later. Re-injection did not appear to be detrimental to future yields, an increase in production of the treated trees being observed in comparison with the controls. There was no visible deleterious effect to bark or foliage.

Twenty selected seedlings of the 1941 planting, affected by brown bast [*R.A.M.*, 31, p. 576] and having dry tapping cuts and brown bark but without trunk distortion, each received 4 gm. copper sulphate in June, 1950, and were re-injected in December. The results indicated that this appears to be a possible means of curing trees suffering from the disorder except for those that are distorted. Only one tree of the 20 remained dry. The yield from treated trees was very irregular from one tapping day to another and the rapidity and period of response varied considerably for different trees. In Indo-China the best time for injection appears to be at the beginning of the dry season.

Bugnicourt (F.). **La maladie des 'raies noires' de l'écorce saignée.** [Black stripe diseases of the tapped bark.]—*Cah. I.R.C.I.*, 2, pp. 41–67, 13 pl. (3 col.), 10 figs., 10 graphs, 1946. [Received November, 1952.]

In the first part of this comprehensive study of stripe canker of *Hevea* rubber, which in Indo-China is believed to be due solely to *Phytophthora palmivora* [*R.A.M.*, 31, p. 399], the author describes the chief characters of the disease, the gradual development of the lesions, the reaction of the tree to infection, and clonal susceptibility and resistance. The second part deals exhaustively with the systematic position and biology of *P. palmivora* (four isolates obtained in 1942 and 1943 from material from widely separated plantations in Cochin China and Cambodia), while the third is devoted to control. On cowpea seed in water numerous sporangia were produced in two or three days. On pieces of *Hevea* bark in sterile water the mycelium formed a dark brown plectenchymatous veil in the top part of the liquid, with abundant aerial and immersed sporangia, and a few chlamydospores. All four strains were considered to belong to *P. palmivora*, from which they differed only in the measurements of the chlamydospores. Preventive treatment of the tapped panel with yellow vaseline, minium (crude wood oil 75 per cent., colophane 17 per cent., minium 8 per cent.), or pale tar emulsion (crude wood oil 35 per cent., wood tar oil or coal tar 10 per cent., water 55 per cent.) is recommended, bark so treated continuing to exercise its normal physiological activity. Curative treatment, if the disease is not too advanced, can be carried out with the same materials, coal tar (crude wood oil 40 per cent., resin from *Shorea vulgaris*, *S. thorelli*, or other *S.* species, or colophane 20 per cent., coal tar 40 per cent.), or asphalt (asphalt 58 per cent., vaseline, coal tar, and wood oil each 14 per cent.). In more serious cases all the diseased parts must be cut away before treatment, or tapping must be discontinued. A bibliography of 47 titles is appended.

Venkat Ram (C. S.). **Soil bacteria and chlamydospore formation in Fusarium solani.**—*Nature, Lond.*, 170, 4334, p. 889, 1952.

At the University Botany Laboratory, Madras, two bacteria isolated from the black cotton soils of southern India, *B* I (not yet finally identified) and *B* II (*Bacillus*

licheniformis), when seeded in 2 per cent. agar inoculated with a soil isolate of *Fusarium solani* [*R.A.M.*, 30, p. 365] at 27° to 29° C., stimulated chlamydospore formation significantly. Stimulation was also induced by the addition of metabolites of the bacteria.

Skinner (F. A.), Jones (P. C. T.), & Mollison (J[anet] E.). **A comparison of a direct- and a plate-counting technique for the quantitative estimation of soil micro-organisms.**—*J. gen. Microbiol.*, 6, 3–4, pp. 261–271, 2 graphs, 1952.

Estimates of numbers of micro-organisms occurring in Broadbalk soils receiving farmyard manure (plot 2), no manure (plot 3), and complete minerals plus ammonium sulphate (plot 7), made at Rothamsted Experimental Station, Harpenden, Herts., by a direct-counting method [*R.A.M.*, 27, p. 449] were compared with those by a plating technique. Direct counts were made with a $\frac{1}{6}$ objective over the whole field. A non-selective medium based on Erikson's 'artificial soil solution' [ibid., 26, p. 511] was used for plating bacteria and actinomycetes; the plates were then incubated for two weeks at 25° C. and the colonies counted with a hand lens. Fungi were plated on Czapek-Dox and Waksman's agars adjusted to pH 4·6 and on Conn's glycerol sodium asparaginate medium, final counts being made after incubation for nine days at 25°. The same soil sample was used for both methods but for the direct count the initial suspension was obtained by grinding a weighed quantity of soil with 15 ml. distilled water while for the plate count it was only shaken in water.

The numbers of bacteria obtained from plate counts were, with one exception, consistently higher on plot 2 than on 3 and 7, which were very similar. By the direct method the total numbers of bacteria detected were 40 to 50 times higher than by the plating method. The highest counts of actinomycetes by the plate method were also obtained on plot 2. Direct counts of actinomycetes are impracticable at present owing to the difficulty of distinguishing their filaments from fungal hyphae and their spores from bacteria.

On both Czapek's and Waksman's media plot 3 consistently gave the lowest numbers of fungal particles (estimated in thousands per gm.) and plot 7 generally the highest. On Conn's medium the numbers from all plots were higher but 7 was not so consistently higher than 2. Direct counts of mycelial fragments per gm. soil were two to six times greater than in plate counts. Various theories are propounded to explain the disparity between these two methods. Since the difference for fungi is small it could be explained satisfactorily by the selectivity of the plating medium and the direct counting of non-viable fragments. In spite of the fact that it gives an over-estimate of the viable population the latter method is considered reliable for quantitative investigations. It is rapid and saves labour and equipment as both fungi and bacteria can be examined in the same soil film.

Zambettakis (C.). **Recherches sur l'helminthosporiose de l'Œillette et son traitement.** [Researches on helminthosporiosis of the Poppy and its treatment.]—*Ann. Inst. nat. Rech. agron.*, Sér. C. (*Ann. Épiphyt.*), 3, 1, pp. 11–59, 12 figs., 3 graphs, 1952.

In this detailed study of poppy leaf blight carried out at the Central Station of Plant Pathology, Versailles, the author uses the name *Pleospora calvescens* (stat. conid. *Helminthosporium papaveris*), relegating *P. papaveracea* [*R.A.M.*, 31, p. 257] to synonymy. He covers the history and geographical distribution of the disease, synonymy of the perfect and imperfect states of the causal fungus, its morphology, the development, liberation, and germination of the ascospores, host-parasite relations, and control. Inoculations of unwounded leaves and stems of healthy poppies with conidia gave negative results even in a saturated atmosphere, but when the surfaces were slightly scratched before inoculation infection ensued

in four to five days. When a spore suspension was sprinkled on young and adult plants kept under cloches lesions developed in three days, and the infected leaves withered. The mycelium spread to the stalks of some plants kept in the greenhouse, perithecia developing the following autumn.

In laboratory and greenhouse tests with ten types of fungicide the best control was given by seed dusting with copper *o*-oxyquinolinate (18 per cent. copper) at the rate of 600 gm. per hl. seed, which completely inhibited germination of the spores and had no adverse effect on seed germination even after one year. At 700 gm. per hl. iron dithiocarbamate, because of its great tenacity, also gave good results, though it was less effective than the copper compound. The best liquid treatment was given by 0·02 per cent. unalcoylthydroxymercury, which was the least toxic to seed germination of all the organo-mercury compounds; most of these were highly fungicidal but also highly injurious to the seed.

Brown (J. G.) & Boyle (Alice M.). **Safflower rust appears in Arizona.**—*Plant Dis. Reptr*, 36, 8, pp. 325–326, 2 figs., 1952. [Multilithed.]

Safflower rust (*Puccinia carthami*) [*R.A.M.*, 31, pp. 459, 631] has appeared in an experimental planting at the Salt River Valley Farm of the Experiment Station, Mesa, Arizona. The severely affected plants were grown from seed of Nebraska variety No. 852 obtained from California and described as giving heavier yields. Earlier supplies of commercial seed from California were not affected.

Wahlin (B.). **Några parasitangrepp på Oljedådra.** [Some parasitic attacks on the Oil *Camelina*.]—*Växtskyddsnotiser, Stockh., 1951*, 5–6, pp. 90–93, 1951.

Camelina sativa, which has recently been brought into cultivation in Sweden, was attacked in 1951 [see next abstract] by *Albugo candida* [*Cystopus candidus*: *R.A.M.*, 25, p. 416] and *Botrytis cinerea*, both in Östergötland. The former caused a certain reduction in yields but the latter was much more serious; the affected plants (representing up to half the stand in some fields) attained only two-thirds of their normal height, while flowering was meagre and seed production negligible.

Borg (Å.). **Ytterligare några parasitangrepp på Oljedådra.** [Some further parasitic attacks on the Oil *Camelina*.]—*Växtskyddsnotiser, Stockh., 1952*, 2, pp. 20–23, 2 figs., 1952.

Sown in Västergötland, Sweden, in soil infested by club root (*Plasmodiophora brassicae*), *Camelina sativa* [see preceding abstract] proved equally susceptible with white mustard and summer rape [cf. *R.A.M.*, 25, p. 147]. Isolated plants were also attacked by *Peronospora parasitica* [ibid., 25, p. 416].

Mungomery (R. W.). **Maryborough–Bauple district quarantine against chlorotic streak disease.**—*Cane Grs' quart. Bull.*, 15, 3, pp. 89–90, 1952.

This article deals with general control measures against sugar-cane chlorotic streak [*R.A.M.*, 31, p. 352] and the extent to which they are applicable in the Maryborough and Bauple Mill areas of Queensland [loc. cit.] in relation to a recent Proclamation (No. 21) which declares a quarantine for infected farms.

Story (C. G.). **Pineapple disease in the Mackay district.**—*Cane Grs' quart. Bull.*, 15, 3, pp. 92–95, 1 fig., 1952.

Climatic conditions in the Mackay district of Queensland during 1951 were responsible for an epidemic of sugar-cane pineapple disease [*Ceratostomella paradoxa*: *R.A.M.*, 31, pp. 352, 537, and next abstract] which was more widespread than it had ever been. Q.50, Q.28, and P.O.J.2878, besides other varieties in localized areas, were affected on all classes of land and situations, and even on blocks where

standover had previously been destroyed. Dipping the plants in aretan (1 lb. in 20 gals. water) [loc. cit.] before replanting for the fourth time resulted in excellent germination in the same field within a month. Similar results were obtained by growers who used this method; the extra cost for 12 tons of cane, using 40 gals. aretan and an extra labourer (8-hr day), worked out at £25 for 20 acres.

King (N. J.). **Factors affecting the germination of the Sugar Cane plant.**—*Proc. Qd Soc. Sug. Cane Technol., 1952*, pp. 133–141, 1952.

Factors affecting sugar-cane germination and the best ways of dealing with them are briefly discussed. Preventing or delaying the entry of soil organisms into the cane plant until after germination are apparently the best preventive measures. *Ceratostomella paradoxa* [see preceding abstract], responsible for the majority of germination failures in Queensland, was particularly serious in the Burdekin district [see next abstract] where in some extreme cases fields had to be planted five times before a reasonable stand of cane was assured. A sprayer device attached to a cutter planter, spraying aretan solution (1 lb. per 20 gals.) on to the cut ends when the plant is falling down the planter chute, is being developed.

Buzacott (J. H.). **Varietal changes in the Burdekin district.**—*Proc. Qd Soc. Sug. Cane Technol., 1952*, pp. 155–159, 1 graph, 1952.

Sugar-cane varietal changes which have been made during the period 1934 to 1950 in relation to diseases in the Burdekin district, Queensland [*R.A.M.*, 31, pp. 297, 299, and preceding abstract], are briefly outlined. It is hoped that these changes will continue in the future at a more rapid rate and that there will be an increase in the plantings of Pindar and Trojan which, with the establishment of the Lower Burdekin Sugar Experiment Station, will later be supplanted by new varieties specially bred to suit the particular requirements of this district.

Diseases.—*Rep. Hawaiian Sug. Exp. Sta. 1951*, pp. 21–26, 7 figs., 1951.

In this annual report of the Experiment Station, Hawaiian Sugar Planters' Association, for 1951 [cf. *R.A.M.*, 30, p. 78] L. D. Baver describes laboratory experiments in which 32 different fungicides were tested against *Pythium* root rot of sugar-cane seedlings [*Pythium* spp.: loc. cit.]. Rosin amine D acetate was effective at 2, 1, ½, and ¼ per cent., but not at lower rates. Treatment with phygon gave satisfactory control in flats.

In germination studies at the Pathology Plot 'good seed', consisting of four three-eye cuttings from each actively growing stalk of the variety 32–8560, and 'poor', i.e., seven to eight cuttings from stalks which had tasselled and lalaed, were planted in March when conditions were favourable for germination. Germination percentages were higher for all cuttings treated with phenyl mercuric acetate immediately after cutting, though it was faster and the growth better from the 'good' cuttings. When 'good' cuttings were inoculated with pineapple disease (*Ceratostomella paradoxa*) [ibid., 30, p. 582 and above, p. 100] one day before or on the day of planting, germination and growth were better than when it was carried out two or three days earlier. A very low percentage of germination was obtained from all untreated 'poor' cuttings, whether inoculated with *C. paradoxa* or not.

Lanjouw (J.), Baehni (C.), Merrill (E. D.), Rickett (H. W.), Robyns (W.), Sprague (T. A.), & Stafleu (F. A.). **International Code of Botanical Nomenclature adopted by the Seventh International Botanical Congress, Stockholm, July, 1950.**—(Regnum Vegetabile Vol. 3), 228 pp., Utrecht, International Bureau for Plant Taxonomy and Nomenclature, 1952. 15.90 Fl. or 30*s*.

This revised International Code of Botanical Nomenclature incorporates the recommendations of the Seventh International Botanical Congress [cf. *R.A.M.*,

16, p. 480; 27, p. 497; 30, p. 381]. A complete French translation appears on pp. 160–219. [The rules are discussed and explained in *C.P.S. News*, 5, 1, 9 pp., 1952.]

Losa (M.). **Notas micológicas.** [Mycological notes.] *-Coll. bot., Barcinone*, 3, 2, pp. 147–161, 1952.

This list of fungi collected for the most part near Rupit, Gerona, Spain, includes *Heterosporium gracile* [*Didymellina macrospora*] on leaves of *Iris germanica* [cf. *R.A.M.*, 30, p. 568], *Septoria antirrhini* on leaves of *Antirrhinum meonanthum* [cf. ibid., 11, p. 329], and *Entyloma fuscum* on *Papaver dubium* [cf. ibid., 16, p. 563].

Walker (E. A.), Rogerson (C. T.), & Jenkins (Anna E.). **Additional collections of Plantain scab and Violet scab from several North Central States.**—*Plant Dis. Reptr*, 36, 8, pp. 331–332, 1952. [Multilithed.]

Collections of *Sphaceloma plantaginis* on plantain (*Plantago* spp.) [*R.A.M.*, 26, p. 408] in Illinois, Indiana, Iowa, Kansas, Missouri, Ohio, and Wisconsin and of *S. violae* on violet (*Viola* spp.) [ibid., 28, p. 217] from two localities in Kansas are listed. *S. violae* is recorded for the first time on *V. patrinii*.

Simmons (E. G.). **Culture studies in the genera Pleospora, Clathrospora, and Leptosphaeria.**—*Mycologia*, 44, 3, pp. 330–365, 13 figs., 1952.

In studies at the Department of Botany, Dartmouth College, Hanover, New Hampshire, isolations were attempted with ascospores from perithecia of 43 collections of species of *Pleospora* [cf. *R.A.M.*, 29, p. 123; 31, p. 354], *Clathrospora* [loc. cit.], and *Leptosphaeria* [cf. ibid., 12, p. 726]. *C. diplospora*, *C. elynae*, and *L. heterospora* [cf. ibid., 10, p. 583; 27, p. 78] produced conidia in culture which were all referable to the *Alternaria tenuis* group, but statistical analyses of their conidial lengths indicated that under certain environmental conditions the three species could be differentiated on this basis. Mature perithecia were produced by *P. ambigua*, *P. njegusensis*, *P. trichostoma* [or *Pyrenophora teres*], *C. diplospora*, an isolate of a large-spored variety of *C. diplospora*, and *P. rainierensis*. Conidial strains did not produce perithecia or perithecial strains conidia.

Zogg (H.). **Beitrag zur Kenntnis der brasilianischen Hysteriaceen.** [Contribution to the knowledge of the Brazilian Hysteriaceae.]—*Ber. schweiz. bot. Ges.*, 59, pp. 23–43, 9 figs., 8 graphs, 1949. [English summary. Received July, 1952.]

This is a critically annotated list of eight Hysteriaceae [cf. next abstract] collected in south-eastern and southern Brazil, including a new genus.

Zogg (H.). **Über einige schweizerische Hysteriaceen.** [On some Swiss Hysteriaceae.] —*Ber. schweiz. bot. Ges.*, 62, pp. 275–295, 14 figs., 1952. [English summary.]

In this further contribution to the knowledge of the Hysteriaceae are brief descriptions of *Hysterographium fraxini* [on ash: *R.A.M.*, 3, p. 181; 22, p. 504] and nine other species represented in Switzerland, including a new one.

Bose (S. R.). **Horse-hair fungus from Bengal.**—*Mycopathologia*, 6, 2, pp. 76–78, 1 pl., 1951. [Received July, 1952.]

Mycelial cords collected from sundrie (*Heritiera minor*), *Dalbergia sisoo*, and other trees in Bengal were identified by C. Bresadola as rhizomorphs of *Marasmius equicrinis* [*R.A.M.*, 23, p. 503; 27, p. 261] and *M. pangerangensis*. Many tiny fruit bodies of *Marasmius* appear in the rainy season on fallen infected leaves and twigs. No damage is done to the host trees.

Ramakrishnan (T. S.). **Additions to fungi of Madras—XII.**—*Proc. Indian Acad. Sci.*, Sect. B, 35, 3, pp. 111–121, 9 figs., 1952.

This list [cf. *R.A.M.*, 31, p. 634] includes descriptions of eight new species, one new combination, and the following records: *Sphacelotheca fagopyri* affecting buckwheat at Keti, Nilgiris; *Phakopsora desmium* on cotton leaves [cf. ibid., 8, p. 355; 29, pp. 294, 333] at South Kanara and Tirunelveli; and *Uredo artocarpi* on *Artocarpus integrifolia* [*A. integer*] on the Adathorai estate, Nilgiris.

Pavgi (M. S.) & Thirumalachar (M. J.). **Notes on Indian Ustilagineae. IV.**—*Mycologia*, 44, 3, pp. 318–324, 27 figs., 1952.

Notes are given on six further species of Indian smuts [cf. *R.A.M.*, 31, p. 147 and next abstract], including *Sphacelotheca bicornis* [cf. ibid., 9, p. 744], hitherto reported only from Brazil, on *Cymbopogon flexuosus* inflorescences in the Nandi Hills, Mysore, *Sorosporium turneri* (McAlpine, Smuts of Australia 185, 1910), not previously recorded in India, in ovaries of *Eragrostis* sp. from Majhgawan, Uttar Pradesh, and *Tilletia setaricola* n.sp. in ovaries of *Setaria intermedia* from Benares.

Mundkur (B. B.) & Thirumalachar (M. J.). **Ustilaginales of India.**—84 pp., 148 figs., Kew, Commonwealth Mycological Institute, 1952. 20*s*.

This book presents a taxonomic treatment of the smuts of India and Pakistan [cf. preceding abstract]. It brings together the data resulting from study of many new collections and re-study of most of the older specimens [cf. *R.A.M.*, 19, p. 237 *et seq.*]. Descriptions are provided for 205 species and four varieties, classified in 21 genera. This is an increase of more than 100 species for India since 1930 [ibid., 11, p. 545]. Citation and synonymy are given for each genus and species, and 148 species are provided with figures. No new species is described, but one new combination is proposed. The hosts and localities known in India and Pakistan are given and a host index is appended.

The book is an important contribution to the knowledge of the Ustilaginales; it is the first to deal with a large area in Asia, an area extending into the tropics.

Garg (D. N.). **Some new diseases of economic plants in the Uttar Pradesh.**—*Agric. Anim. Husb., Uttar Pradesh*, 1, 9, pp. 12–14, 1951. [Received December, 1952.]

Rice blast (*Piricularia oryzae*) [*R.A.M.*, 31, p. 54; C.M.I. map No. 51] was observed for the first time in the Uttar Pradesh, India, in the Etawah district in November, 1948. Potato blight (*Phytophthora infestans*) [ibid., No. 109; *R.A.M.*, 31, p. 572] occurred in Hapur, Meerut district, in 1948, 1949, and 1950, and the area affected in 1949 was estimated to be not less than 1,000 acres. The disease was reported from the Bulandshahr district as well. Mangoes at Kanpur were attacked by red rust (*Cephaleuros mycoidea*) [ibid., 19, p. 135] in March, 1948. Fruit spot of papaw due to the same organism is common throughout the region.

Martyn (E. B.). **Diseases of economic plants in Trinidad and Tobago.**—*J.* [formerly *Proc.*] *agric. Soc. Trin. Tob.*, 51, 4, pp. 475–506, 6 pl., 1951.

This bulletin, written for the benefit of planters, the field staff of the Department of Agriculture, and the members of the Agricultural Society, summarizes all the available information on the commoner diseases of cultivated plants in Trinidad and Tobago [*R.A.M.*, 30, p. 489 and above, p. 65] and their control.

Keegel (E. L.). **Studies in blister blight control. IX. The effect of spray residues on the quality of manufactured Tea.**—*Tea Quart.*, 23, 1, pp. 2–6, 1952.

In this further contribution to the present series [cf. *R.A.M.*, 31, p. 517] the results are described of an investigation carried out in 1950–51 on the St. Coombs

estate, Ceylon, into the effect on the fermentation of the leaf and the quality of made tea of copper sprays applied to tea bushes against blister blight [*Exobasidium vexans*: ibid., 31, p. 579 and next abstracts]. The evidence obtained clearly demonstrated that the quality, appearance, colour, and strength of the tea from sprayed areas are better than from comparable unsprayed areas. It is not possible entirely to exclude absorption of small amounts of copper [cf. ibid., 30, p. 587], with some effect on quality, but the data were insufficient to warrant further discussion. One area was experimentally oversprayed and the resulting copper content of the teas was over 250 p.p.m. The teas were condemned as lacking in quality, the infusions being dull and dark greenish. It is possible that small amounts of copper sufficient to stimulate fermentation are absorbed during routine sprayings, with entirely beneficial effects.

Loos (C. A.). **Studies in blister blight control. X. Evaluation of some copper containing fungicidal dusts in the control of blister disease of Tea.**—*Tea Quart.*, 23, 1, pp. 6–11, 1 diag., 1952.

A small-scale experiment carried out in 1951 at the Cairness Division of Mattakelle Estate, Talawakelle, Ceylon, to test the dusting of tea bushes against blister blight [*Exobasidium vexans*: see preceding abstract] by means of a portable hand-operated duster is described. Five proprietary copper dusts were used in 13 formulations at 2, 4, 6, and 8 per cent., and at application rates of 5 lb. per acre every five days and 10 lb. every five or ten days.

Using the criterion that control less effective than that given by wet spraying [*R.A.M.*, 31, p. 3 and next abstracts] is inadequate, all the 2 per cent. formulations were in this category even when applied at the highest rate. On the other hand, 4 per cent. cuprosana dust [ibid., 31, p. 579] at 5 lb. per acre every five days was promising under conditions to be expected in normal years; for control as effective as spraying the highest rate may be required.

At prevailing prices 6 per cent. copper dusts are uneconomic on tea in plucking. The barely perceptible increase in control given by this concentration over 4 per cent. cuprosana would not justify the use of the former even if prices were lower.

Lamb (J.). **Crop protection by wet spraying compared with crop protection by dusting in 1951.**—*Tea Quart.*, 23, 1, pp. 12–14, 1952.

The author discusses the comparative merits of spraying and dusting against blister blight of tea [*Exobasidium vexans*: see preceding and next abstracts] in the light of the further experience gained in Ceylon during 1951. For spraying the recommendations on concentration remain the same. The rate of application should average 12 to 15 gals. per acre, and the rounds should not be longer than ten days, but may be less if the circumstances warrant, when the concentration of the copper fungicide should be proportionately reduced, provided the plucking rounds can be adapted to permit spraying immediately after plucking. Areas dusted or sprayed during heavy rain may require further protection. North-east monsoon mornings with bright sunshine are ideal for spraying, but work done during an afternoon downpour of the north-east monsoon type is probably almost useless. The best time for dusting is before 8 a.m. on sunny days when the air near the ground is cold and the leaves are wet with dew or with the previous day's rain. Dull, overcast days and similar days with light rain also favour dust retention.

Gatehouse (R. C.). **Blister blight control on Dessford Group in 1951.**—*Tea Quart.*, 23, 1, pp. 15–18, 1952.

In 1951 a large-scale spraying and dusting trial against tea blister blight [*Exobasidium vexans*: see preceding abstracts] was conducted on the Dessford

Group of estates, Ceylon. Spraying was carried out using 2½ to 5 oz. of copper per acre in a suspension of 4 oz. cuprokylt [*R.A.M.*, 31, p. 355] per 10 gals. of water, concentration depending on the incidence of infection; the fields were sprayed weekly until fine weather set in during November, and then every ten days. Dusting was done with cuprosana dust, 2 to 6 per cent., applied at various rates.

The author considers that it is impossible to say whether spraying or dusting is the better method [cf. ibid., 30, p. 588], each having its own advantages. The cost of dusting 1,000 acres in plucking, with a yield of 700 lb. per acre, for six months of the year, ranged from 7·7 to 13·3 cents per lb., while for spraying it worked out at 7 to 9·3 cents excluding the cost of extra labour, which more than doubled the expense.

Cuprokylt gave good results. For tea in plucking in periods of severe infection it was necessary to apply 4 oz. copper per acre every seven days; for tea recovering from pruning in similar periods 5 oz. were necessary. Cuprosana dust (2 per cent.) at 5 lb. per acre every five days did not give adequate protection in fields where infection was severe; at 4 per cent. and the same rate it gave excellent protection of tea in plucking, and even 10 lb. per acre every ten days was adequate; at 6 per cent., 5 to 10 lb. per acre every seven days gave excellent protection to tea recovering from pruning, the results being as good as those obtained by spraying.

For an expenditure of some Rs. 39,000 on control the crop (704,710 lb.) showed an increase of 157¾ lb. per acre over that of 1950 [loc. cit.].

Johnston (A.). **Blister blight of Tea in Malaya. 2. Results of two spraying experiments.**—*Malay. agric. J.*, 34, 4, pp. 160–165, 3 pl., 1 graph, 1951.

In further studies on tea blister blight (*Exobasidium vexans*) in Malaya [*R.A.M.*, 31, p. 517] spraying experiments were carried out on pruned tea bushes at the Agricultural Station, Tanah Rata, to compare the effect of perenox, koneprox, Shell copper fungicide, blitox (all at 0·25 per cent.), and Bordeaux mixture (2–2–40). All gave equally good control, reducing the total of stem blisters to not more than one, and the mean number per leaf to 0·225 to 0·435 compared with 98 and 2·589, respectively, for the untreated. In a test of different concentrations and volumes of perenox spray applications of between 2 and 8 oz. per acre gave adequate control, a concentration of 0·25 per cent. at the rate of 10 to 20 gals. per acre being the most satisfactory dosage. Knapsack sprayers are recommended as they reduce the labour and volume of spray required.

Hyre (R. A.). **Wind dissemination of Peronospora tabacina.**—*Plant Dis. Reptr*, 36, 8, p. 335, 1952. [Multilithed.]

In a test at the University of Delaware Experimental Farm, Newark, a tobacco bed established where no tobacco had been grown for many years was sown with seed from field plants from Pennsylvania where *Peronospora tabacina* does not occur on mature tobacco. Precautions were taken to prevent contamination of the bed. One spot of blue mould was found on 24th June. The nearest plant beds were in Pennsylvania, north of Homeville, 20 air miles from the Farm, and scattered infection was present in them. The nearest plant beds in Maryland were over 20 miles away. Four small home plantings of an ornamental species of *Nicotiana* in Newark were not infected. It seems safe to assume that the inoculum for the infection at Newark was wind-borne for at least 20 miles [cf. *R.A.M.*, 27, p. 163; 31, p. 150].

Pasfield (G.). **Tomato spotted wilt: control with DDT sprays.**—*Agric. Gaz. N.S.W.*, 63, 3, pp. 138–144, 2 graphs, 1952.

Following the successful reduction of spotted wilt [virus] on tomato in New South Wales [*R.A.M.*, 27, p. 222] in 1947 by spraying with DDT [cf. ibid., 30, p. 250;

31, p. 40], further experiments were conducted in 1948 and 1949 at Wentworthville, near Sydney. The 1949 results only were taken into account since wilt incidence was very low in 1948. The treatments, commenced on 19th September, were: 0·1 per cent. DDT mayonnaise emulsion applied (*a*) once, (*b*) twice, or (*c*) three times per week, or (*d*) once a week until 28th October and then twice a week until 30th December, and (*e*) 0·1 per cent. methoxychlor miscible oil (an analogue of DDT) applied twice a week. Grosse Lisse plants were used throughout, one half being planted in mid-September and the other in mid-October. The sprays were applied with a portable power sprayer giving an approximate pressure of 125 lb. per sq. in. Thrips incidence was lower than in either of the two previous years.

Spraying three times a week was significantly superior to twice-weekly, which was significantly better than once a week with DDT or twice-weekly with methoxychlor. Wilt incidence was generally low but was significantly higher in the October-set plants than in the September ones. Much symptom variation was observed in the course of the experiment. Observations during the past four years favour the conclusion that *Thrips tabaci* is the sole vector of the virus in Sydney.

It is concluded that under local conditions spraying at least twice a week during October and November is desirable for early tomato crops, with more frequent applications if practicable.

Lesley (J. W.), Middleton (J. T.), & McCarty (C. D.). **Simi, a processing Tomato resistant to Verticillium and Fusarium wilts.**—*Hilgardia*, 21, 10, pp. 289–299, 2 figs., 1 graph, 1952.

The Simi tomato, bred at Riverside, California, is reported resistant to *Verticillium albo-atrum* [cf. *R.A.M.*, 30, pp. 138, 635] and *Fusarium oxysporum* f. [*bulbigenum* var.] *lycopersici* [ibid., 31, p. 542] and has yielded well on infested soil in the coastal plain of southern California and in the Simi Valley. It originated from a cross between Riverside [ibid., 20, p. 37] and N.D. 216–2–3 and is recommended particularly for processing on account of its fleshiness and deep red colour.

Grente (J.). **Le Phytophthora cinnamomi parasite du Châtaignier en France.** [*Phytophthora cinnamomi*, a parasite of the Chestnut in France.]—*C. R. Acad. Sci., Paris*, 234, 22, pp. 2226–2228, 1952.

Studies on the etiology of the dying-off of chestnuts in France in 1951 showed that over 90 per cent. of the cases investigated were due to either *Phytophthora cambivora* or *P. cinnamomi* [*R.A.M.*, 31, pp. 152, 406, and next abstract]. In a comparative study 50 French isolates proved more resistant to the action of malachite green than the strains used by Urquijo [Landaluze: ibid., 29, p. 235], but no taxonomic value is accorded to this somewhat inconsistent mode of differentiation between the two species. Moreover, the polymorphism of *P. cinnamomi* is such that certain strains resemble *P. cambivora* in their morphology. Contrary to Tucker's observations [ibid., 10, p. 754], both species are equally pathogenic to potato tubers. The polyphagy and widespread occurrence of *P. cinnamomi* [ibid., 30, p. 128] are characters of the highest importance, and it must be regarded as one of the most destructive parasites of valuable woody plants. *P. cambivora*, on the other hand, seems to be fairly strictly specialized on the chestnut and possibly on the walnut. In large-scale inoculation experiments on homogeneous chestnut populations little difference in virulence was observed between the two species.

Grente (J.) & Solignat (G.). **La maladie de l'encre du Châtaignier et son évolution.** [Chestnut ink disease and its development.]—*C. R. Acad. Agric. Fr.*, 38, 3, pp. 126–129, 1952.

Co-operative studies were begun in 1948 by the Centre for Agronomic Research, Central Massif, the Society for Chestnut Reforestation, Brize (Corrèze), and the

Research and Experiment Station of the National School of Waters and Forests on the importance of ink disease (*Phytophthora cambivora* and *P. cinnamomi*) [see preceding abstract] in causing the decline of chestnut trees in France. The pathogen enters the root system at the root tips and frequently attains the collar. It is emphasized that the black exudation from the base of the trunk is neither a constant nor a specific symptom of the disease, and can be induced by mechanical injury or by frost, while seriously affected trees may show no symptoms. *Castanea crenata* and *C. mollissima* appear wholly resistant.

Isolations from soils established that the causal organisms may remain alive in the soil for several years after the trees have gone. They are also present in groves at an altitude of over 1,000 m. where no damage occurs.

Peace (T. R.). **Poplars.**—*Bull. For. Comm., Lond.*, 19, iv+50 pp., 24 pl., 1952. 7*s.* 6*d.* net.

This bulletin on poplar cultivation in Great Britain [see next abstract] elaborates the information given in *Leafl.* 7 [*R.A.M.*, 27, p. 590] and supersedes *Bull.* 5 [ibid., 3, p. 243], the text of which has been entirely re-written. Chapter 3 (pp. 28–45) deals with diseases and pests, section I with those caused by inorganic agencies, and section IV with those caused by fungi and bacteria. Observations over several years in various parts of England showed that *Populus deltoides*, × *P. laevigata*, *P. nigra betulifolia*, × *P. marilandica*, × *P. regenerata*, and × *P. gelrica* are resistant to leaf rust (*Melampsora* spp.) [cf. ibid., 30, p. 636]. As most of the valuable varieties are seldom severely attacked the disease need not cause anxiety if highly susceptible varieties are avoided. Observational data on natural infection by bacterial canker (*Pseudomonas syringae* f. sp. *populea*) [ibid., 32, p. 43] in various parts of England and Scotland indicate that *P. nigra betulifolia* is highly resistant.

Report on forest research for the year ending March, 1951.—vi+139 pp., 4 pl., 1 fig., 1 diag., London, H.M. Stationery Office, 1952. 4*s.* 6*d.* net.

In the section of this report [cf. *R.A.M.*, 30, p. 590] dealing with poplars and poplar cultivation (pp. 83–87) [see preceding abstract] T. R. Peace and R. F. Wood state that following inoculations with bacterial slime in 1950 only very few trees developed typical cankers [*Pseudomonas syringae* f. sp. *populea*: loc. cit.]. Differences in degree of healing between susceptible and resistant varieties were frequently appreciable. The results clearly indicated susceptibility in *Populus trichocarpa* H.T., *P.* androscoggin, *P.* northwest A, and *P. tremula* × *tremuloides*. Bacterial canker was observed on *P. candicans* a few miles south of Inverness; the disease now appears to extend over the whole of Great Britain, with the possible exception of north-west Scotland. It was a bad year for rust attacks by *Melampsora* spp. [loc. cit.]. Two clones, Maine and O.P. 19, both hybrids raised by Stout and Shreiner [cf. ibid., 30, p. 636], developed severe infection by *Dothichiza populea* [ibid., 31, pp. 39, 260]; *Cytospora chrysosperma* [*Valsa sordida*: cf. ibid., 31, p. 523] was also present. In 1951 *D. populea* was very serious on newly planted stocks, especially larger plants.

T. R. Peace, in a general review of tree diseases in Great Britain, 1950–51 (pp. 94–98), states that debility of Corsican pine [*Pinus nigra* var. *calabrica*] at a number of sites in the north of England and in Scotland has been variously attributed to *Brunchorstia destruens* [cf. ibid., 25, p. 323] and autumn frost [ibid., 24, p. 210], but the fungus does not appear to be generally present and many affected sites are in positions where unseasonable damaging frosts would seem to be highly unlikely. The relationship between larch canker, frost, and provenance has now been established [ibid., 29, p. 392], but the possible role of *Dasyscypha* [spp: ibid., 30, p. 203] has, perhaps, been neglected. During the year, Dr. Manners

of the Botany Department, Southampton, carried out successful wound inoculations with *Dasyscypha* on larch near Penzance, an area free from injurious frosts. It is certain that the fungus, given entry, can extend the damage without further intervention by frost. In the spring of 1951, probably owing to wet weather during the preceding nine months, severe attacks by *Lophodermium* [*pinastri*: ibid., 15, p. 267] were reported from various parts on Scots pine and other pines up to 25 years of age. At Westbury bacteria were generally present as well as *Nectria* in cases of beech canker and bark die-back [cf. ibid., 31, p. 91], and it seems as if several complex and possibly inter-related diseases are involved. In 1950 elms on the Isle of Sheppey were badly attacked by Dutch elm disease [*Ceratostomella ulmi*: ibid., 29, p. 541], where it has occurred previously, but much less seriously. Now that the slow progress of the disease has long been under observation the continuation of annual surveys appears to be unnecessary. The cost of spraying and of systemic fungicides is prohibitive for large trees. The best control of *Keithia* [*Didymascella*] *thujina* [loc. cit.] appeared to be given by growing plants [? *Thuja plicata*] from seed sown in isolated nurseries. The nurseries in which the experiments are being made are still free from infection after three seasons.

In the summary report on 1950 experiments of the sub-committee on nutrition problems in forest nurseries (pp. 113–122) E. M. Crowther and B[lanche] Benzian state that treating the soil in many nurseries with dilute solutions of formalin [cf. ibid., 31, p. 297] in the manner commonly employed for the 'partial sterilization' of greenhouse soils induced very striking effects on growth of Sitka spruce [*Picea sitchensis*], untreated plots having a full stand of poor plants. In practice it might be economic to use less than the standard amount of commercial formalin (1 lb. per sq. yd., suitably diluted), and the application might be mechanized. In parallel experiments in six nurseries, when no formalin was given, neither inorganic fertilizers nor compost gave good plants (mostly one-year Sitka spruce) in three established nurseries. Formalin improved growth in all nurseries under all manurial conditions, except on two very acid plots receiving fertilizers but not compost. The gains from formalin were outstanding at all nurseries when compost was given and in several nurseries plants given fertilizer also were conspicuous for their rich blue-green colour. At the three established nurseries nitrogen and phosphate had only small effects, while formalin had small effects with nitrogen alone, relatively large effects with phosphorus alone, and very large effects with both together. The data available so far indicate that Sitka spruce plants raised with formalin in old-established nurseries behave as well in the forest as those from some of the younger research nurseries with acid soils, but not as well as those from Wareham.

In experiments at Old Kennington (Oxford) and Ampthill (Bedfordshire) nurseries and on potted soils from these at Rothamsted no fungicide (of several tested) gave benefits approaching those from steam and formalin, though several reduced damping-off in the pot tests. Some seriously reduced plant numbers. The evidence indicates that 'partial sterilization' involves something beyond the destruction of soil fungi.

In researches in soil mycology (pp. 123–126), Ida Levisohn found that root material from planting experiments with various tree species at Wareham Forest, Dorset, examined at different seasons, showed great increase in long- and short-root formation [ibid., 31, p. 347] where an organic surface mulch (bracken or heather) was applied; root infection was simultaneously increased. Many years' observations have shown that check to shoot growth and severe chlorosis in Norway spruce [*Picea abies*] are associated with arrest of root development and absence or remarkable scarcity of mycorrhiza [loc. cit.] whether the trees grow in a wet or dry part of the area. The check symptoms are rapidly removed by mulching. At the same time incidence or type of root infection or both undergo a striking change. In a planting experiment begun in 1942 unmulched Norway spruce remained in

check, the roots being invaded by *Mycelium radicis atrovirens* (beta) [cf. ibid., 25, p. 518], whereas heather-mulched plants improved considerably. It appears that by favouring mycorrhizal development the mulch protects the roots from deleterious infections [cf. ibid., 23, p. 143]. In all the experiments examined heather mulch brought about full development of mycorrhiza while the check unmulched plants remained non-mycorrhizal. A heather mulch also greatly stimulated the endotrophic mycorrhizal infection [cf. ibid., 29, p. 526] of Lawson cypress [*Chamaecyparis lawsoniana*] and birch; the checked, unmulched trees of the former were severely infected by a *Rhizoctonia*, apparently carried over from the nursery. At Sugar Hill checked, unmulched alder buckthorn [*Frangula alnus*] has no normal root associations, but a subnormal type of endotrophic mycorrhiza; a bracken mulch produced a rich development of healthy mycorrhiza.

In large-scale pot experiments on pseudomycorrhizal infection pines rather than spruces were selected as test plants because in soil from old-established nurseries they develop easily diagnosed associations produced by hyphae invading the cortical tissues intracellularly in an early stage of seedling development. So far, the results are as follows. Haustorial infection is characteristic of pines growing in old-established nurseries of the agricultural type. The causal mycelia have been obtained in pure culture. Though not endemic in heathland soils they are easily introduced into them, causing heavy pseudomycorrhizal infection only in those poor in microbial activity; in sand cultures minute soil inocula containing an haustorial fungus produce root systems fully pseudomycorrhizal, of the intracellular type. Haustorial mycelia vary widely in virulence, but because they prevent true mycorrhizal formation are undesirable. They appear to occur in soils and other media where a suitable mycorrhiza-former is absent or its activity is inhibited. As yet there is no proof that under natural conditions mycelia normally forming mycorrhiza can be converted into pseudomycorrhiza-formers.

The results of investigations on *Fomes annosus* by S. D. Garrett [cf. ibid., 31, p. 640] and on the effect of partial sterilization on the fungal flora of an old forest nursery soil by J. H. Warcup [ibid., 31, p. 297] have already been noticed from other sources.

Sooty bark disease of Sycamore. Cryptostroma corticale.—*Leafl. For. Comm., Lond.*, 30, 7 pp., 2 col. pl., 1952.

This pamphlet presents essential information on the sycamore sooty bark disease, its causal organism *Cryptostroma corticale* [*R.A.M.*, 31, p. 582], and control.

Schuldt (P. H.). **Sprays for control of Sycamore anthracnose.**—*Proc. Iowa Acad. Sci.*, 58, pp. 201–207, 4 figs., 1951. [Received November, 1952.]

A survey in spring and summer, 1948, of the incidence of plane [*Platanus* spp.] anthracnose (*Gnomonia veneta*) [*G. platani*: *R.A.M.*, 32, p. 42] in 50 counties in Iowa disclosed the disease in 97 per cent. of the trees examined. In the spring of 1949 and 1950, however, incidence and severity were greatly reduced. During these two years sprays [ibid., 28, p. 38] were applied to 187 trees 25 to 50 ft. high in Polk Boulevard and to 155 trees 50 to 80 ft. high in Thompson Avenue, Des Moines, Iowa.

Phenylmercuri-triethanol ammonium lactate caused recognizable injury in 1949 and distinct damage in 1950. All the materials used in Polk Boulevard decreased the prevalence of infection during both years. In 1949 the decreasing order of effectiveness was (1) Bordeaux mixture, (2) 2,3-dichloro-1,4-naphthoquinone, (3) tribasic copper sulphate, (4) ferbam, and (5) phenylmercuri-triethanol ammonium lactate. Comparable results were obtained in 1950 except for a reversal between (2) and (3). On the basis of two years' results Bordeaux mixture seems highly satisfactory for the control of sycamore anthracnose.

Mańka (K.) & Stube (Teresa). **Występujący na Brzozach grzyb Poria obliqua (Pers.) Bres. i jego rozwój na sztucznych pożywkach.** [The Birch fungus *Poria obliqua* (Pers.) Bres. and its development on artificial media.]—*Acta Soc. Bot. Polon.*, 21, 3, pp. 517–536, 7 figs., 1952. [English summary.]

A description is given of a cultural study of *Poria obliqua* [*R.A.M.*, 18, p. 146; 29, p. 542; 31, p. 359] isolated from mycelial outgrowths on birch stems in the Virgin Forest of Białowieża and in the District of Poznań, Poland. K. Zaleski's synthetic agar (2 per cent. saccharose, 0·1 per cent. magnesium sulphate, 0·1 per cent. citric acid, 0·15 per cent. peptone, 0·15 per cent. potassium dihydrogen phosphate, and about 1 per cent. ferric chloride in an extract of dried plums and dried pears at the rate of 1 to 1) was apparently the best artificial medium for the growth of the fungus, fructifications of which formed four to six weeks later, especially if the fungus grew in juxtaposition with a *Penicillium* sp. The basidia measured 18·5 to 22·2 (25·9) by 7·4 to 10·1 μ and the basidiospores 8·3 to 11·1 by 4·6 to 6·5 μ. In the hymenium were large (over 40 μ), dark brown, thick-walled setae. On birch twigs, where growth was satisfactory, fructification occurred only after about seven months. No growth occurred on elm twigs. The optimum temperature and pH for the growth of the fungus were ±30° C. and 7, respectively.

Fergus (C. L.), Young (W. L.), & Morris (C. L.). **A preliminary report of the compatibility of Oak wilt fungus isolates in Pennsylvania.**—*Plant Dis. Reptr*, 36, 8, pp. 327–329, 1 map, 1952. [Multilithed.]

A study at the Department of Botany, Pennsylvania State College, of 17 isolates of *Chalara quercina* [*R.A.M.*, 31, pp. 37, 522, and next abstract] from 16 different infection areas in the State showed that in no instance did any single isolate or mass transfer produce fertile perithecia [ibid., 31, p. 357]. Many of the strains were inter-fertile and ascospores were produced. The fact that inter-fertile strains may be found in the same county supports the view that infected trees should be eradicated. Wide variation was found between different strains in the production of fertile perithecia. One cross might produce perithecia in one trial but not in later ones, and pairings that should have produced fertile perithecia on a compatibility basis did not always do so.

Hoffman (P. F.). **Screening chemotherapeutants for control of Oak wilt.**—*Proc. Iowa Acad. Sci.*, 58, pp. 139–147, 1951. [Received November, 1952.]

In the Department of Botany and Plant Pathology, Iowa State College, over 80 chemicals were screened for their capacity to inhibit spore germination of the oak wilt fungus, *Chalara quercina* [see preceding abstract], for ability to neutralize the toxin produced by the fungus, and for toxicity to host tissue. Sixteen inhibited germination completely at 1 p.p.m., eight of which, namely, sodium dimethyl dithiocarbamate plus sodium 2-mercaptobenzothiazole, crystal violet, malachite green, copper 8-hydroxyquinoline, 8-hydroxyquinoline benzoate, 8-hydroxyquinoline sulphate, phenyl mercury lactate, and phenyl mercury salt with thiazole group, were effective at 0·1 p.p.m.

Toxin production and its inactivation were measured by the amount of wilting produced in Bonny Best tomato cuttings after 48 and 72 hours in known quantities of various concentrations of the chemical and equal quantities of culture filtrates containing the toxin. Phenyl mercury lactate and diphenyl quanidine phthalate, both at 1 p.p.m., rendered the toxin completely harmless.

Injury to cuttings of red oak [*Quercus rubra*] placed in solutions of the chemicals was measured by the degree of wilt and leaf necrosis. In general, injury was slight at 1,000 p.p.m., while in field and greenhouse trials 8,000 p.p.m. failed to produce comparable injury.

Lohwag (K.). **'Pignolifäule'.** ['Pignolia rot'.]—Reprinted from *Mitt. öst. Ges. Holzforsch.*, 3, 6, 2 pp., 1 fig., 1951. [Received July, 1952.]

Following invasion by *Stereum frustulosum* [*S. frustulatum*: *R.A.M.*, 26, p. 573; 28, pp. 148, 605], an old oak in the Lainz Zoological Garden, Austria, was further attacked by *Polyporus sulphureus*. The mycelial 'nests' of the latter species filled up the cavities produced by the former, resulting in a picture reminiscent of peeled seeds of 'pignolia' [trade name for edible seed of the nut pine, *Pinus pinea*]. The designation 'pignolia rot' is therefore applied to this peculiar double decay.

Lohwag (K.). **Bienenwabenfäule, hervorgerufen durch Phellinus nigrolimitatus (Romell) B. et G.** [Honeycomb rot incited by *Phellinus nigrolimitatus* (Romell) B. & G.]—*Int. Holzmarkt* (*Holzforschung*, Ser. 3), *1950*, pp. 22–24, 3 figs., 1950. [Received September, 1952.]

A description is given of the honeycomb rot of spruce caused by *Phellinus* [*Fomes*] *nigrolimitatus*, which was observed in 1947–8 at an altitude of 1,700 m. in the Salzburg region of Austria.

Lepori (L.). **Deperimento del Leccio causato dallo Stereum gausapatum Fr.** [Wilt of Ilex caused by *Stereum gausapatum* Fr.].—*Notiz. Malatt. Piante*, *1951*, 17, pp. 60–63, 1951. [English summary, p. 70. Mimeographed.]

In May, 1950, and July, 1951, sporophores of *Stereum gausapatum* [cf. *R.A.M.*, 13, p. 810; 21, p. 396; 30, p. 97] were found on pruning cuts on holm oaks (*Quercus* [*ilex*]) growing at Tivoli, near Rome; young, growing branches were occasionally affected. On withered branches and on cuts the fruiting bodies were long and well developed, while on living branches they were small and shell-shaped.

Mielke (J. L.) & Cochran (G. W.). **Differences in spore surface markings of three Pine rusts, as shown by the electron microscope.**—*Mycologia*, 44, 3, pp. 325–329, 1 pl., 1952.

Representative aecidiospores from widely separated regions in the United States of *Cronartium filamentosum* [cf. *R.A.M.*, 30, p. 349] from *Pinus ponderosa* var. *scopulorum*, *C. stalactiforme* from *P. contorta*, and *C. harknessii* [cf. ibid., 13, p. 738] from *P. contorta* and *P. ponderosa* were examined under the electron microscope to determine whether the merging of these three rusts into one species on this basis was justified. In *C. filamentosum* the annulations on the spores appeared generally acutely serrated in outline and the tops of the processes flattish and rather finely and irregularly serrated. In *C. stalactiforme* the annulations were generally obtusely serrated in outline and the tops of the processes roundish and more coarsely serrated than in *C. filamentosum*. In *C. harknessii* the processes were infrequently annulated and the annulations, when present, were obtuse; the tops of the processes were irregularly rounded and usually more coarsely serrated than in *C. stalactiforme*. A magnification of ×25,000 clearly illustrated the differences, which are considered to support the view that the three organisms should be treated as distinct species.

Strong (F. C.). **Damping-off in the forest tree nursery and its control.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 34, 3, pp. 285–296, 5 graphs, 1952.

In tests at the Michigan State College Forest Tree Nursery 25 fungicides were used over a three-year period both in the nursery and in the greenhouse for the control of damping-off of conifer seedlings, mostly red pine [*Pinus resinosa*: *R.A.M.*, 30, p. 638; 31, pp. 411, 639]. The disease is due to fungi of the genera *Pythium*, *Phytophthora*, *Fusarium*, and *Rhizoctonia* [loc. cit.]. The best control was obtained with ceresan M plus potassium iodide (12 per cent. damping-off) when mixed with the soil at the rate of 150 lb. per acre before seeding. Similar applications of

experimental fungicide 5400, copozinc, manzate, new improved ceresan plus potassium iodide, and tersan reduced damping-off from nearly 100 per cent. to 30 per cent. or less in the order given, while three applications of the last-mentioned, used as a sprinkle treatment at 50 lb. per acre at weekly intervals after seeding, also resulted in 30 per cent. damping-off. Crag 658 (dust) was also successful (31 per cent.) and is recommended for trial as a seed treatment.

The above treatments are suggested for small-scale trials only.

Mangenot (F.). **Recherches méthodiques sur les champignons de certains bois en décomposition.** [Systematic studies on the fungi attacking certain rotting timbers.]—*Rev. gén. Bot.*, 59, 702, pp. 381–399; 704, pp. 477–519; 705, pp. 544–555, 2 pl., 8 figs., 1952.

In the first part descriptions are given and a systematic study made of the following new or interesting fungi isolated from rotting timber: *Dictyostelium minutum* on birch, *Pyrenochaeta* ? *bergevini*, *Phialophora verrucosa* [*R.A.M.*, 22, p. 23], and *Margarinomyces* (*Trichosporium*) *heteromorpha* n. comb. [ibid., 26, p. 322] on [unspecified] wood, and *M. h.* var. *robusta* n. var. on birch and *M.* (*Ceratocladium*) *microsperma* n. comb. on ash.

Parts II and III comprise an ecological study extending over three or four years of the fungal succession on the surface and interior of standing and fallen trees (mostly dead) in various stages of decay, and of beech sawdust. In all, 230 species of fungi were isolated, of which 98 were imperfect forms. Four new species are described. Even the facultative lignicolous fungi showed considerable cellulolytic ability, while the wood destroyers were less numerous and were chiefly members of the Hymenomycetes.

Bärlund (Ulla). **Laboratorieförsök beträffande rötsvamparnas inbördes konkurrensförmåga.** [Laboratory tests of mutual competition between wood-destroying fungi.]—*Karstenia*, 1, pp. 60–72, 2 figs., 1 graph, 1950. [English summary, pp. 70–72.]

In wood-block tests carried out at the State Forestry Institute, Finland, to determine the ability of wood-rotting fungi to live in wood previously exposed to decay or in process of being attacked by another species [cf. *R.A.M.*, 31, p. 583] the organisms used in the primary (fungus I) and subsequent (fungus II) infections were *Coniophora cerebella* [*C. puteana*], *C.* sp., *Merulius domesticus* [*M. lacrymans*], *Poria vaporaria*, *Polystictus versicolor*, *Fomes ungulatus*, *Trametes serialis*, *Lenzites sepiaria*, and two strains of *Lentinus lepideus*. Pine sapwood (5 by 2·5 by 1·5 cm.) was used throughout except for *P. versicolor* for which asp[en: *Populus* sp.] was used. The results indicated that in primary infections no antibiotic substances were formed that exercised a directly restraining effect on secondary invaders, growth of the latter depending, apparently, on general conditions. Only *M. lacrymans* and *C.* sp. were able to force out *C. puteana*, with which most of the tests were made. *T. serialis* displayed the greatest destructive ability, but was overcome by *C. puteana*. It appeared that the competitive capacity of a species was not directly proportional to its destructive power. Species with rapidly growing, ample, surface mycelium and an ability to develop strands seemed to be more favoured than slow species with submerged mycelium.

As the stage of rot of the test block appeared to influence the destructive ability of the second fungus, a series of blocks was exposed to *C. puteana* for periods ranging from seven to 147 days. The blocks were then sterilized at 105° C. and placed on fresh cultures of *L. lepideus* for two months. A curve showing the loss in weight due to each fungus indicated that the effect of *C. puteana* on *L. lepideus* does not depend on a preventive, poisoning effect, but on impoverishment of the wood in substances necessary for *L. lepideus*.